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# Chemical Industries Hold Large Exposition

## Seventeenth Exposition of Chemical Industries Held At Grand Central Palace, New York, December 4-9—More Than 300 Participating Firms On Three Floors Display Raw Materials and Chemical Equipment.

The seventeenth Exposition of Chemical Industries opened December 4 at the Grand Central Palace, New York. Twenty outstanding research achievements were featured in the pulp and paper and in other industries. The comprehensive displays of equipment and processing machinery included containers of every type. Specialties included paper drums, waterproof paper-lined bags, multiple-wall bags, a low-priced cellophane bag making machine and others. Of particular interest to the paper industry are the following exhibits:

### H. Reeve Angel & Co.

H. Reeve Angel & Company, Inc., 7-11 Spruce street, New York, exhibited Whatman and Reeve Angel Filter Papers on the second floor.

The Whatman filter papers are said to be especially adapted to high grade analytical work, while Reeve Angel filter papers are primarily intended for manufacturing and industrial purposes.

Representatives included Ernest Child, president, Thomas L. Harrocks, Vice-president, and L. C. F. Rain, Vice-president.

### Bird Machine Co.

The Bird Continuous Centrifugal Filters were featured at the booths of the Bird Machine Company, South Walpole, Mass., on the third floor. These filters are extensively used in the process industries for a wide range of filtration work, such as the separation of granular solids from liquids, and for the separation of fine, unfilterable solids, such as pigments.

Representatives in attendance included, George Sherrerd,, manager of the centrifugal division, F. X. Ferney, Eric Piper, John McKeon, Erwin Beach and Henry H. Shepherd.

### The Bristol Co.

A modern process-control technique that is stated to be setting new standards for cost and product uniformity, was featured by The Bristol Company, Waterbury, Conn., at its booths on the main floor.

The Bristol System of Coordinated Process Control provides for coordinating and interlocking all of the vital events of a process, such as time of operation of valves, pumps, blowers, electrical equipment, and the control at a definite value, or according to a time-program, of such variables as temperature, pressure, liquid level, flow, humidity, speed and chemical concentration. The various control instruments developed by The Bristol Company to operate individually or as a part of these control systems were exhibited in operation.

### Casein Co. of America

A varied line of casein products was exhibited by the Casein Company of America, Division of The Borden Company, on the third floor. The display was designed to tell the story of casein, in its manifold uses and its products, to chemists and industrialists, emphasizing the new casein products obtained through research. Paper coating products, such as casein top sizing lacquers for producing water resistant coatings on paper, resin emulsions, flexible caseins, etc., were among the new products shown.

The following representatives were in attendance: W. F. Leicester, J. F. Corwin, H. M. Hartong, R. J. Lodge, and J. D. Phillips.

### Container Co.

The completely new "Leverpak," dry bulk, shipping drum was featured at the exhibit of The Container Company, Van Wert, O., on the second floor. This patented container of light weight and made of kraft Fourdrinier board, is made in capacities up to 400 pounds and in sizes from 35 to 75 gallons. The company's "Stapak" competitively priced container drums for domestic shipping of dry bulk products, was also displayed, as was also the "Fiberpak" in many sizes.

### Crane Co.

The exhibit of Crane Company on the second floor displayed valves and fittings in four major corrosion-resisting alloys: 18-8 MO chrome-nickel-molybdenum, monel, nickel, and silicon bronze—made with screwed ends in sizes ¼-inch to 2-inch inclusive, and with flanged ends in sizes 1-inch to 4-inch inclusive. A 56-page descriptive booklet was distributed to interested visitors.

A feature of the display was a 6-inch standard iron pipe, size 18-8, cold drawn seamless stainless steel 90-degree bend. One end of this was fitted with a 150-pound Cranelap flange with the other end beveled for welding. The bend had a 3-inch standard iron pipe size 18-8 cold drawn seamless steel pipe welded in with a 3-inch nozzle beveled, welded to the 3-inch pipe, and 3-inch pipe also fitted with 150-pound Cranelap flange.

Representatives in attendance from Chicago were, P. R. Mork, vice-president in charge of sales, Chicago, W. H. Pape, manager valve and fitting department, W. F. Lahl, manager sales service department, H. J.

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# Printing Committee Makes Paper Awards

## Contracts Are Let For Furnishing the Government Printing Office At Washington With Supplies of Paper For the Six Months Period Beginning July 1 — Bids Opened On November 27 — Awards In Detail.

WASHINGTON, D. C., December 6, 1939—Awards were announced on Monday by the Joint Congressional Committee on Printing for paper for the use of Government Printing Office for a six months period beginning January 1. Bids were opened on November 27.

The following awards were announced:

No. 1, National Pulp and Paper Company, Inc., 2.50 cents (200 tons only). Old Dominion Paper Company (remainder of tonnage) 3.2839 cents.

No. 3, Whitaker Paper Company, 5.31 cents.

No. 4, Barton, Duer & Koch Paper Company, 5.12 cents.

No. 5, R. P. Andrews Paper Company, 5.07 cents.

No. 6, Mudge Paper Company, 4.93 cents.

No. 7, Frank Parsons Paper Company, 4.61 cents.

No. 8, Frank Parsons Paper Company, 4.61 cents.

No. 9, R. P. Andrews Paper Company, 4.73 cents.

No. 10, Whitaker Paper Company, 5.43 cents.

No. 11, R. P. Andrews Paper Company, 4.73 cents.

No. 12, R. P. Andrews Paper Company, 4.58 cents.

No. 13, Stanford Paper Company, 5.33 cents.

No. 14, Stanford Paper Company, 10.00 cents—70 lbs. 9.50 cents—100 lbs.

No. 15, R. P. Andrews Paper Company, 5.28 cents.

No. 16, Whitaker Paper Company, 5.39 cents.

No. 17, R. P. Andrews Paper Company, 4.49 cents

No. 18, Stanford Paper Company, 6.52 cents.

No. 19, Paper Corp. of U. S., 12.28 cents.

No. 20, Old Dominion Paper Company, 8.76 cents.

No. 21, Old Dominion Paper Company, 8.76 cents.

No. 22, Old Dominion Paper Company, 8.66 cents.

No. 23, Aetna Paper Company, 10.883 cents.

No. 24, Paper Corporation of U. S., 15.45 cents.

No. 25, Paper Corporation of U. S., 15.45 cents.

No. 26, R. P. Andrews Paper Company, 4.84 cents.

No. 27, R. P. Andrews Paper Company, 4.84 cents.

No. 28, R. P. Andrews Paper Company, 4.84 cents.

No. 29, Whitaker Paper Company, 5.33 cents.

No. 30, R. P. Andrews Paper Company, 4.33 cents.

No. 31, R. P. Andrews Paper Company, 4.33 cents.

No. 36, Whitaker Paper Company, 6.79 cents.

No. 37, Stanford Paper Company, 12.00 cents.

No. 40, Mudge Paper Company, 9.57 cents.

No. 43, Whitaker Paper Company, 4.48 cents.

No. 44, Cauthorne Paper Company, Inc., 6.07 cents.

No. 47, Paper Corporation of U. S., 7.189 cents (for 500,000 to 750,000 pounds only) Aetna Paper Company, 7.233 cents (remainder of lot).

No. 51, R. P. Andrews Paper Company, 10.57 cents.

No. 52, R. P. Andrews Paper Company, 9.65 cents—white. 10.30 cents—blue.

No. 53, Whitaker Paper Company, 11.95 cents.

No. 54, Perkins-Goodwin Company, 5.74 cents.

No. 55, Whitaker Paper Company, 4.73 cents.

No. 56, Whitaker Paper Company, 4.73 cents.

No. 57, Perkins-Goodwin Company, 5.39 cents.

No. 58, Whitaker Paper Company, 4.44 cents.

No. 59, Whitaker Paper Company, 4.44 cents.

No. 60, R. P. Andrews Paper Company, 6.43 cents.

No. 61, Old Dominion Paper Company, 6.1289 cents.

No. 63, Stanford Paper Company, 19.40 cents.

No. 64, No bids.

No. 65, Barton, Duer & Koch Paper Company, 10.08 cents.

No. 66, Barton, Duer & Koch Paper Company, 11.78 cents.

No. 67, Mudge Paper Company, 11.57 cents.

No. 69, Barton, Duer & Koch Paper Company, 15.96 cents.

No. 70, Rejected.

No. 71, Rejected.

No. 73, Marquette Paper Company, 14.68 cents.

No. 74, Stanford Paper Company, 11.83 cents (first 350,000 pounds). Mudge Paper Company, 12.08 cents. (Remainder of lot).

No. 75, Marquette Paper Company, 17.43 cents.

No. 76, Lee Paper Company, 12.69 cents.

No. 78, Barton, Duer & Koch Paper Company, 26.50 cents.

No. 79, Old Dominion Paper Company, 20.948.

No. 83, Barton, Duer & Koch Paper Company, 14.23 cents (100,000 pounds) 14.43 cents (balance).

No. 102, Barton, Duer & Koch Paper Company, 5.69 cents.

No. 109, Aetna Paper Company, 9.433 cents.

No. 110, Aetna Paper Company, 8.043 cents.

No. 111, Aetna Paper Company, 7.393 cents (250 tons) 8.183 cents (balance).

No. 112, Aetna Paper Company, 7.393 cents (250 tons) 8.183 cents (balance).

No. 113, Aetna Paper Company, 7.483 cents.

No. 114. Aetna Paper Company, 9.743 cents.

No. 115, Aetna Paper Company, 8.243 cents.

No. 116, Aetna Paper Company, 7.873 cents.

No. 117, Stanford Paper Company, 7.88 cents.

No. 120, Aetna Paper Company, 11.313 cents.

No. 121, Aetna Paper Company, 8.423 cents (400,000 pounds) 8.883 cents (300,000 pounds).

No. 122, Aetna Paper Company, 8.423 cents (50 tons) 8.883 cents. (balance).

No. 123, Aetna Paper Company, 10.983 cents.

No. 125, R. P. Andrews Paper Company, 19.79 cents.

No. 126, Stanford Paper Company, 17.40 cents.

No. 128, Stanford Paper Company, 18.88 cents.

No. 129, Stanford Paper Company, 18.88 cents.

No. 140, Stanford Paper Company, 22.68 cents.

No. 141, Stanford Paper Company, 19.25 cents.

No. 151, Marquette Paper Company, 5.98 cents.

No. 152, Marquette Paper Company, 5.98 cents.

No. 154, Aetna Paper Company, 7.973 cents.

No. 155, Aetna Paper Company, 8.673 cents.

No. 156, Aetna Paper Company, 8.673 cents.

No. 157, Aetna Paper Company, 9.483 cents.

No. 160, Mudge Paper Company, 9.33 cents.

No. 161, Mudge Paper Company, 9.33 cents.

No. 162, Aetna Paper Company, 9.483 cents.

No. 163, Mudge Paper Company, 9.56 cents.

No. 164, Mudge Paper Company, 9.89 cents.
No. 165, Mudge Paper Company, 9.91 cents.
No. 168, Barton Duer & Koch Paper Company, 13.63 cents.
No. 169, Barton, Duer & Koch Paper Company, 13.63 cents.
No. 170, Barton, Duer & Koch Paper Company, 13.63 cents.
No. 171, Barton, Duer & Koch Paper Company, 13.63 cents.
No. 172, Barton, Duer & Koch Paper Company, 14.95 cents.
No. 173, Barton, Duer & Koch Paper Company, 14.95 cents.
No. 176, Barton, Duer & Koch Paper Company, 17.63 cents.
No. 177, Barton, Duer & Koch Paper Company, 17.63 cents.
No. 178, Barton, Duer & Koch Paper Company, 17.63 cents.
No. 179, Barton, Duer & Koch Paper Company, 17.63 cents.
No. 180, Barton, Duer & Koch Paper Company, 17.63 cents.
No. 181, Barton, Duer & Koch Paper Company, 17.63 cents.
No. 184, Whitaker Paper Company, 5.58 cents.
No. 190, Aetna Paper Company, 8.233 cents.
No. 191, Barton Duer & Koch Paper Company, 11.35 cents.
No. 192, Aetna Paper Company, 8.233 cents.
No. 193, Barton, Duer & Koch Paper Company, 11.35 cents.
No. 196, Mudge Paper Company, 16.57 cents.
No. 197, Mathers-Lamm Paper Company, 11.55 cents.
No. 198, No bids.
No. 201, Whitaker Paper Company, 7.18 cents.
No. 202, Whitaker Paper Company, 7.58 cents (India); Barton, Duer & Koch Paper Company, 7.82 cents (Emerald and light green).
No. 203, Marquette Paper Company, 6.88 cents.
No. 204, Marquette Paper Company, 6.88 cents.
No. 205, Lee Paper Company, 9.99 cents.
No. 209, Old Dominion Paper Company, 4.184 cents.
No. 210, Paper Corp. of U. S., 380 cents.
No. 211, No bids.
No 213, R. P. Andrews Paper Company, 15.90 cents.
No. 214, R. P. Andrews Paper Company, 14.90 cents.
No. 215, Mudge Paper Company, 15.60 cents.
No. 217, R. P. Andrews Paper Company, 4.16 cents.
No. 218, R. P. Andrews Paper Company, 4.16 cents.
No 219, R. P. Andrews Paper Company, 3.92 cents.
No. 220, Rejected.
No. 251, No bids.
No. 252, Mudge Paper Company, $5.47 per M sheets.
No. 254, Whitaker Paper Company, 5.42 cents.
No. 255, Whitaker Paper Company, 5.87 cents.
No. 256, Whitaker Paper Company, 6.37 cents.
No. 257, Whitaker Paper Company, 6.94 cents.
No. 258, R. P. Andrews Paper Company, 5.43 cents.
No. 259, R. P. Andrews Paper Company, 4.73 cents.
No. 260, Rejected.
No. 261, Rejected.
No. 262, Rejected.
No. 263, No bids.
No. 264, Barton, Duer & Koch Paper Company, 4.25 cents.
No. 265, Mudge Paper Company, 7.15 cents.
No. 271, Paper Corp. of U. S., 5.48 cents.
No. 276, Barton, Duer & Koch Paper Company, 7.60 cents (Deduct 35 cents per 100 pounds if shipped direct and stored by G.P.O.)
No. 277, Barton, Duer & Koch Paper Company, 8.60 cents (same condition as above).
No. 280, Mudge Paper Company, 8.20 cents.
No. 281, Paper Corp. of U. S., 4.28 cents.
No. 302, Paper Corp. of U S, $2100 per M sheets.
No. 303, Paper Corp. of U. S., $31.85 per M sheets.
No. 304, Paper Corp. of U S., $44.00 per M sheets.
No. 305, Paper Corp. of U. S., $28.00 per M sheets.
No. 306, Old Dominion Paper Company, 4.174 cents.
No. 307, Barton, Duer & Koch Paper Company, 4.90 cents.
No. 308, Old Dominion Paper Company, 4.444 cents.
No. 309, Old Dominion Paper Company, 4.444 cents.
No. 310, Old Dominion Paper Company, 4.424 cents.
No. 325, R. P. Andrews Paper Company, 4.305 cents (3,000,000 pounds); Barton, Duer & Koch Paper Company, 4.245 cents (750 tons), and 4.295 cents (750 tons).
No. 351, Whitaker Paper Company, $6.15 per hundred sheets.
No. 352, Barton, Duer & Koch Paper Company, $18.10 per hundred sheets.
No. 360, Barton, Duer & Koch Paper Company, 2.28 cents.
No. 361, Barton, Duer & Koch Paper Company, 2.01 cents.
No. 362, Mathers-Lamm Paper Company, 6.00 cents.
No. 363, Mathers-Lamm Paper Company, 5.28 cents.
No. 364, Barton, Duer & Koch Paper Company, 2.63 cents.
No. 365, Barton, Duer & Koch Paper Company, 2.61 cents.
No. 366, Mathers-Lamm Paper Company, 3.66 cents.
No. 367, Mathers-Lamm Paper Company, 3.66 cents.
No. 368, Rejected.

## Starts Work On New Mill

[FROM OUR REGULAR CORRESPONDENT]

TORONTO, Ont., December 4, 1939—The Acme Paper Box Company has started construction on its new mill at 358 Carlow avenue this city. The equipment will consist of an 80 inch combination cylinder and Fourdrinier, six beaters and five jordans. The new plant will make specialties.

# Sharp Rise in Canadian Newsprint Exports

## Bureau of Statistics Reports Total Exports of Newsprint For October Was 5,409,867 Hundredweight, Valued At $12,028,263 — Sulphite Pulp Prices Up $10 Per Ton—Bathurst Paper Co. Improvements Will Cost $2,000,000.

[FROM OUR REGULAR CORRESPONDENT]

MONTREAL, Que., December 4, 1939—A sharp advance in the exports of newsprint, both when compared with the previous month and with the similar month of last year, is reported by the Federal Bureau of Statistics, in detailed figures just released for October. The total for that month amounted to 5.409,867 cwt., valued at $12,028,263, as compared with 4,563,255 cwt., valued at $9,872,464 in September, and 4,961,357 cwt., valued at $10,834,212 in October, 1938. For the 10 months to the end of October the total now amounts to 42,988,704 cwt., valued at $93,208,325, as compared with 39,347,806 cwt., valued at $84,726,627 in the similar period of last year. Of the total exports for October 4,933,569 cwt., valued at $10,935,118, went to the United States. The remainder, amounting to 406,298 cwt., valued at $1,093,146, went to 33 different countries, the principal purchasers being Argentina with 183,643 cwt., valued at $413,579; Australia, with 88,554 cwt., valued at $210,241; Cuba, with 31,566 cwt., valued at $57,503; Puerto Rico, with 28,593 cwt., valued $64,331; Brazil, with 24,220 cwt., valued at $61,035; New Zealand, with 22,274 cwt., valued at $67,606; the United Kingdom, with 18,829 cwt., valued at $30,127; British South Africa, with 13,695 cwt., valued at $30,731; and Venezuela, with 11,250 cwt., valued at $30,011.

### Wood Pulp Exports for October $1,509,679

The total amount of wood pulp exported in October amounted to 1,509,679 cwt., valued at $3,260,926, as compared with 1,001,883 cwt., valued at $2,502,430 in October, 1938. For the 10 months to the end of October the total exports amounted to 10,526,445 cwt., valued at $23,632,674, as compared with 9,008,953 cwt., valued at $22,902,391 for the similar period in 1938.

### Newspaper Problems in Britain

According to advices received here, the newspapers in Great Britain are being published under increasingly difficult conditions as a result of the war and the various regulations and restrictions which are being imposed under governmental authority. Some weeks ago the Paper Controller fixed the price of newsprint at £17 per ton, an increase of five pounds and fifteen shillings over the pre-war rate. This action alone has created a formidable newspaper problem. For example, the London Daily Express and the Sunday Express face together a higher newsprint cost of nearly £450,000 per annum.

### Sulphite Pulp Prices Up $10

An increase of $10 a ton in contract price for sulphite pulp sales for first quarter of 1940—to $60 a ton for bleached sulphite and $50 a ton for unbleached—a natural result of widely improved marketing conditions in recent months, is a bright augury for operations of major sulphite producers next year. Canadian International Paper, Fraser, Abitibi and B. C. Pulp & Paper are principal producers with a saleable excess output.

### Minas Basin Expands Production

From Windsor, N. S., it is announced that by the first of the new year the Minas Basin Pulp and Power Company plant at Hantsport will be prepared to increase its annual output of pulp by 10,000 tons, officials of the company have announced.

### Bathurst Spends $2,000,000 in Improvements

R. L. Weldon, president of Bathurst Power and Paper Company, Bathurst, N. B., states that from January 1st, 1936 to April of next year the company will have expended approximately $2,000,000 on plant extensions and improvements for the purpose of increasing output and decreasing costs of manufacture. The latest expenditure of $400,000 is principally for the purpose of decreasing operating costs and will not be completed until April 1st next. The company's plant is now working at full capacity.

### C. A. Dunning Elected Director

At a meeting of directors of Consolidated Paper Corporation, held here, Hon. Charles A. Dunning was elected to the board. He resumes the directorship which he relinquished upon becoming Minister of Finance some years ago.

## To Organize Junior Group

The National Association of Waste Material Dealers, Inc. has recently addressed a letter to its members outlining a plan which the association is proposing to put through, covering the formation within the association of a Junior Group. This Junior Group would include young men either the sons of members or of executives connected with member companies and in fact, will include any young men holding executive positions with member companies.

This idea was originally presented to the association by David Charak of the Federal Paper Stock Company, St. Louis, Mo., who, himself, has been very active in the association for many years. The suggestion has gained a great deal of support during the past two years as a result of the very fine work done at the San Francisco convention by Ivan L. Green, son of H. L. Green and at the Baltimore convention by Marvin Schapiro a son of Joseph Shapiro.

Plans are now being formulated for bringing together at the Association's Twenty-Seventh Annual Convention in March, the first sizable group of young men who have ever participated in any trade association convention in the waste material field. It is anticipated that this group will have its own officers and hold its own business sessions without any interference on the part of senior members of the association.

No additional dues are planned for membership in the Junior Group.

# Chicago Paper Trade Reports Firmer Market

## Difficulties In Europe Cited As Contributing To Stronger Tone of Market But At Least Half of Gains Made By Local Trade Improvement — Wholesale Paper Trade Net Sales Rise—Tax On Mill Shipments Looms.

[FROM OUR REGULAR CORRESPONDENT]

CHICAGO, Ill., December 4, 1939—After a slight lull, the paper business in this area shows renewed signs of strengthening. Further advances are reported as "in the air" as the foreign situation becomes more serious to those dependent upon foreign pulp for their raw materials. Continued uncertainty abroad, lack of shipping facilities, high risks, etc., are combining to give a strong underlying tone to the entire market structure. It is reported that the mills have enough raw materials for the next few months but beyond that is reported a situation which is unpredictable. The general improvement is credited, it is reported, about 50 per cent to local business improvement and perhaps as much again to the uncertainties abroad. The entire market reflects the situation with krafts continuing in strength, bonds and ledgers showing good demand and a strong undertone, books ad covers in the same category and waste papers, particularly the higher grades, reporting more and more activity.

### Wholesale Paper Trade Net Sales Rise

Wholesale trade in paper and paper products during October, 1939, accurately reflected the general improvement in business in the seventh federal reserve district. Paper and products division showed a 20.7 per cent increase in net sales, a 7.3 per cent increase in stocks, an increase of 13.2 per cent in accounts outstanding and an upturn of 24.5 per cent in collections for October, 1939 as compared to the same month in 1938. The figures, for the States of Michigan, Iowa, Wisconsin, Indiana and Illinois, show that the paper industry made a better showing in net sales, stocks, accounts standing and collections than did the group as a whole. From an employment and earnings standpoint, the paper and printing industry in the seventh federal reserve district had 732 firms reporting with a total of 78,009 wage earners. Earnings totaled $2,322,000 with the wage earners indicating an increase of 3.2 per cent for the week of October 15 as compared to the week of September 15. Earnings increased 6 per cent over the same period. This compares to an increase of 3.7 per cent in wage earners and of 7.9 per cent in earnings for the general industrial group.

### Sales Tax on Mill Shipments Looms

Paper mills with representatives in Illinois have another interesting problem to face with reference to the Illinois sales tax. Certain mill representatives have reported to us that their merchant customers have requested mill shipments in Illinois to be sent with the mill name on the bill of lading in order that the sales tax will not apply under interstate commerce restrictions. According to legal counsel, it is said, the merchant may request a car load of paper for an Illinois printer or general user and ask the mill, located outside the State, to handle the transaction entirely through the bill of lading procedure. In this way, it is reported, the transaction would be interstate in character and thus not susceptible to the 3 per cent Retailers Occupation Tax. On the other hand, it would probably be the decision of the Department of Finance that in the event the merchant avoids liability for the tax the liability would then go back a step further or onto the mill making the shipment and over which the state has jurisdiction because it maintains local offices. There is, likewise, the possibility of the mill assuming a "retail status" and of even having to obtain a license to do business in Illinois. At least, it would seem that this is a matter for mill-merchant cooperative discussion.

## Bagley & Sewall Restore Wage Cut

WATERTOWN, N. Y., December 4, 1939—Announcement is made here that the Bagley & Sewall Company has restored half of the ten per cent wage cut made last June. Workers all through the plant, including office help and engineers, will share in the increase. Abe Cooper, president, stated that the concern was glad to make the wage restoration and hopes within a short time to restore the balance. About 225 employees are affected. The five per cent restoration amounts to about $500 a week in the payroll which is estimated now at about $6,000 weekly or practically double what it was in June when the force was much smaller. Material increase in the business of the concern since the new owner assumed control early in the summer has made it possible not only to build up the number steadily employed but also to restore a part of the reduction.

Harry C. Kinne has tendered his resignation as vice president, sales manager and purchasing agent of the concern after about forty years of service. He has accepted a position in the sales department of the Black-Clawson Company, at Hamilton, Ohio, and will permanently take over his new position about January 1. Since the local concern was reorganized in June he has held the three offices he is resigning and observed his fortieth anniversary with the company last summer. He is among the best known residents of the city and as a city official his length of service exceeds that of any other present public officer. He has been a member of the city council for 24 years and during the past few years has played a prominent part in politics.

## Goes With Brightwater Paper Co.

L. E. Maglathlin, former vice president and sales manager of the Keith Paper Company, Turners Falls, Mass., was appointed to the position of sales manager of the Brightwater Paper Company of Adams, Mass. He will make his headquarters in New York. Mr. Maglathlin from 1906 to 1936 was with the Strathmore Paper Company. He started in the mill and was sales manager and vice president when he left to join the Keith Paper Company.

# Legislature To Investigate Abitibi Soon

## Inquiry Into Attempted Reorganization of Abitibi Power & Paper Co. and Association of Forests Department With Lake Sulphite Co. Scheduled For January 12, 1940—Would Limit Pulp Wood Exports To U.S.

[FROM OUR REGULAR CORRESPONDENT]

TORONTO, Ont., December 4, 1939—Investigation into the attempted reorganization of the Abitibi Power and Paper Company and the association of the provincial Department of Lands and Forests with the now bankrupt Lake Sulphite Pulp Company will be made immediately after the Ontario Legislature Timber Probe Committee is convened on January 12 next, it was decided at an organization meeting held in Toronto this week. The committee was appointed at the session of the Legislature last spring when Col. George Drew, opposition leader, moved than an investigation be made into the administration of the lands and forests branch and its conservation policies. Hon. Paul Leduc, chairman of the committee, said in connection with the Lake Sulphite Pulp Company, it would be the duty to examine how it came into existence, the steps which led to its organization, the assurance that the Minister of Lands and Forests had that it would be adequately financed before sale of stock was permitted and the steps which led up to bankruptcy before the plant at Red Rock, Ont., was completed. Mr. Leduc claimed that investigation into this phase was not for the purpose of attaching blame but to "diagnose the disease" in this particular case to prevent a repetition. When the committee starts the probe in January, Hon. Peter Heenan, minister of Lands and Forests will be the first witness.

### Favors Limiting Pulp Wood Exports

Hon. C. W. Cox, Mayor of Port Arthur, and a former member of the cabinet of Ontario says that the most accessible and best stands of pulp wood in Northern Ontario are being cut and exported to the United States to keep American mills at full capacity while Ontario mills are on a quota. Mr. Cox, who is a widely known pulp wood dealer, says that he originated a movement several years ago for a limited exportation of pulpwood, but the present policy of the Ontario government is "suicidal." He declared that from the Thunder Bay district alone enough wood was being exported every year to keep six large paper mills in operation and give employment to 2,500 men in skilled trades. He added, in contrast, that Port Arthur was becoming a lumberjack town. There was not enough bush labor in Ontario to cut the large quantities of wood being exported so that men from other provinces come in and make their season's stake and then go home and spend their money. There are 5,000 men in Thunder Bay bush camps and 2,500 more in Kenora and Rainy River district camps. Hon. Peter Heenan, Minister of Lands and Forests, said that the statement of Hon. C. W. Cox "smacked of municipal politics" and that Mr. Cox was the chief advocate in the policy of exporting pulp wood in unlimited quantities and it was strange that he should change his mind on the eve of an election.

### To Produce Yeast From Wood Sugars

To meet the rapidly increasing demands for their product in Central and Western Canada, Best Yeast, Limited, of Liverpool, Nova Scotia, has for some time been planning to erect a second Canadian Yeast Plant. The location now decided upon is Thorold, Ontario, in the Niagara Peninsula. The plant is on the property of the Ontario Paper Company, Limited, one of the largest newsprint mills in Canada. Like in Liverpool, where Best Yeast Limited is operating in conjunction with the Mersey Paper Company, Limited, the new plant in Ontario will also use the pure health giving sugars of Canadian spruce for the manufacture of Yeast. It will be recalled that the Liverpool plant was the first one on this side of the Atlantic Ocean using this modern patented process for the manufacture of yeast. The new Ontario plant will be the second one on the American continent to utilize the valuable spruce sugars, formerly wasted in the wood cooking process for the manufacture of paper.

### George Earneshaw Goes to Head Office

George Earneshaw formerly assistant manager of the Toronto office of E. B. Eddy Company, Limited, has been transferred to the head office of the company at Hull, Que., as manager of the fine and coarse paper division in the home office. He has been with the company since 1924. Bradford Ellison is the general sales manager of the E. B. Eddy Company, Ltd.

### Dominion Envelope Doing Well

Dominion Envelope and Cartons (Western), Limited, has declared a dividend of $14 a share on arrears and a semi-annual dividend of $3.50 on the 7 per cent preferred stock, both payable Dec. 1 to shareholders of record Nov. 20. After this payment, arrears will amount to $1.75 a share.

An extra dividend of 60 cents per share, plus the regular quarterly dividend of 40 cents per share, was declared on the common stock of Moore Corporation Limited, Toronto. This represents an increase of 20 cents on the bonuses of 40 cents per share distributed in January of this year and in January, 1938. Business for the first half of the current year was well up on the comparative period of 1938, in which year earnings more than covered dividend requirements. The company also announced the regular quarterly dividend of $1.75 per share on the Class "A" and "B" preferred issues.

### Spruce Falls Announces Employee Plan

Spruce Falls Power and Paper Company, Limited, Kapuskasing, Ont., has announced a plan of remuneration for employees on active military service. Wages and salaries will be paid equal to the difference between amount paid by the company at time of departure on service and that paid by the government, up to 50 per cent of the existing wages or salaries. After honorable discharge an employe shall be given an opportunity, upon application, to return to an occupation as circumstances permit. Certain necessary conditions are attached to the arrangement.

# Masonite Corp. Purchases Cellufoam Plant

## Acquisition of Cellulose Fiber Processing Plant of Cellufoam Corp. Strengthens Position of Masonite In Industrial Field — J. M. Conway Presides At Meeting—Outagamie Takes Over Patten Co.—Other News.

[FROM OUR REGULAR CORRESPONDENT]

APPLETON, Wis., December 4, 1939—Masonite Corporation, with main offices at Wausau, Wis., has purchased the assets of Cellufoam Corporation of New Jersey and Cellufoam Corporation, a Delaware corporation, according to announcement made last week by Ben Alexander, president.

The New Jersey corporation has for the last eight years manufactured "Cellufoam" under patent licenses granted it by the Delaware corporation. Johnson & Johnson, manufacturers of surgical supplies and pharmaceutical products, was the principal stockholders in the New Jersey corporation, and Sidney F. Schwarz, Chicago, was the principle stockholder of the Delaware corporation.

The sale includes transfer of all the physical assets of the New Jersey corporation as well as the assignment of the patents and trade-marks of the Delaware corporation to the Masonite Corporation. There was no stock purchase.

Cellufoam, a distended fibrous sheet for both thermal and acoustical insulation, is now being produced and marketed by the Cellufoam division of Masonite Corporation, Mr. Alexander said in making the announcement in Chicago.

"The acquisition of Cellufoam greatly strengthens the position of Masonite in the industrial field and broadens its already extensive line," President Alexander said. "Masonite is now in a position to furnish an insulating material of high efficiency for all types of building construction and for a wide range of manufactured products."

As thermal insulation, Cellufoam is widely used in refrigerating equipment, railroad cars, airplanes, automobiles, trucks and buses, for air-conditioning ducts and pipe covering. It is used in homes, offices, theaters, churches, schools and other public buildings, radio stations, telephone booths and bandshells as acoustical insulation.

Mr. Alexander explains that the Cellufoam process is just the opposite of that used for Masonite. In the former, a foaming agent is employed to distend the cellulose fibers, while in the Masonite process giant presses are used to press the fibres together. Although it is extremely porous and weighs only one and one-quarter pounds per cubic foot, the new Masonite product is sufficiently rigid to support its own weight and will not sag or settle.

The Cellufoam plant at 6565 S. Lavergne Ave., Chicago, is being leased by Masonite from the Clearing Industrial District of Chicago.

### Kimberly-Clark Building New Bridge

Kimberly-Clark Corporation, Neenah, Wis., is starting construction of a new bridge across the Fox River at its Badger-Globe mill at Neenah, Wis., preparatory to embarking upon its mill expansion program. The work will be done by Fluor Brothers Construction Company, Oshkosh, Wis. Work was held up until the City of Neenah could fulfill its agreement to purchase land for an outlet for the bridge where it crosses a canal. The land was acquired from the Winnebago Realty Company by the city for $2,000, with the sale conditioned upon the use of the land only for industrial expansion purposes.

Kimberly-Clark found it necessary to supplement its present egress and exit from the property to take care of increased trucking, shipping and movement of employee vehicles to and from the Badger-Globe mills before enlarging its operations. No details have been announced yet of its building plans, but it is understood they have reached an advanced stage and that work may be started this winter.

Additional switching facilities also are to be provided. The Soo Line Railroad has completed plans to build another track from its main line across the Fox River to the mill so as to take care of increased movement of cars. The trestle will run from the present bridge adjacent to the mill as far as the spur extending to the plant of the Bergstrom Paper Company.

### J. M. Conway Presides

Joseph M. Conway, president of Hoberg Paper Mills, Inc., Green Bay, Wis., presided last week at the annual convention of the Wisconsin Manufacturers Association, of which he is president. The organization met at Milwaukee. In his message, Mr. Conway told the business and industrial executives they should devote more time to public affairs. If they do not take such interest, he said, business as a private enterprise is doomed. "If the chief executive of your firm thinks he is too busy to take part in community matters, you would better hire another executive," Mr. Conway asserted.

In commenting upon business conditions, Mr. Conway said indications at present point to as good a year in 1940 for business as was experienced this year. There has been over buying in the rush following immediately after the outbreak of the European war, but it has not been alarming. He added a slight recession from the peaks of September and October is to be expected, but that it probably will not be of sizeable proportions unless some unforeseen developments occur.

There is some question, asserted Mr. Conway, as to how sound the business gains are, because it is admitted improvement following the start of the European war was brought about by pressure on the part of all business, not only for immediate consumption but for replenishing inventories, and by some speculative buying. He feels, however, the outlook for next year is encouraging.

### Outagamie Takes Over Patten Co.

The newly organized Outagamie Mills, Inc., will take over the former Patten Paper Company (Outagamie Paper Company) mill after a period of five years, according to a contingent sales contract entered into between Milford J. Taylor, Appleton, Wis., and

*(Continued on page 33)*

# Financial News of Pulp and Paper Industry

## Abitibi, Crown Zellerbach, Rayonier and Schumacher Wall Board Show Increased Earnings—A. P. W. Paper Co. Reports Profit—United Paperboard Loses $42,598 — S. D. Warren Company Declares $1 Dividend.

**New York Stock Exchange**

High, Low and Last for the Week Ending December 6, 1939

| | High | Low | Last |
|---|---|---|---|
| Armstrong Cork Co. | 41 | 37 | 41 |
| Celotex Corp. | 10⅝ | 10⅛ | 10⅝ |
| Celotex Corp., pf. | 60½ | 60 | 60½ |
| Certain-Teed Products Corp. | 6⅞ | 6⅛ | 6⅞ |
| Certain-Teed Products Corp., pf. | 33⅛ | 31 | 33⅛ |
| Champion Paper & Fibre Co. | 24⅜ | 23½ | 23½ |
| Congoleum-Nairn Co. | 24 | 23¼ | 23¾ |
| Container Corp. of America | 17 | 14⅞ | 17 |
| Continental-Diamond Fibre Co. | 7⅜ | 7 | 7⅛ |
| Crown-Zellerbach Co. | 16¾ | 15⅛ | 16¾ |
| Crown-Zellerbach Co., pf. | 89½ | 88 | 88½ |
| Flintkote Co. | 21⅞ | 20⅝ | 21¾ |
| Robert Gair | 4⅛ | 3⅝ | 4⅛ |
| Robert Gair, pf. | 16½ | 15⅞ | 16½ |
| International Paper & Power | 13⅝ | 11½ | 13½ |
| International Paper & Power, pf. | 51¼ | 45⅛ | 51⅛ |
| Johns-Manville Corp. | 79 | 73 | 78½ |
| Kimberly Clark Corp. | 34 | 33 | 33 |
| MacAndrews & Forbes | 30¾ | 30¾ | 30¾ |
| MacAndrews & Forbes, pf. | 134 | 134 | 134 |
| Masonite Corp. | 38⅜ | 36½ | 38⅜ |
| Mead Corp. | 10⅞ | 9 | 10⅞ |
| Mead Corp., pf. | 62 | 61 | 62 |
| Paraffine Companies, Inc. | 42⅞ | 40¼ | 42 |
| Paraffine Companies, Inc., pf. | 99½ | 97 | 99½ |
| Rayonier, Inc. | 16⅜ | 15½ | 16⅛ |
| Rayonier, Inc., pf. | 27 | 26 | 27 |
| Ruberoid Co. | 20 | 18⅝ | 19½ |
| Scott Paper Co. | 47 | 45½ | 46½ |
| Scott Paper Co., pf. | 114 | 113⅞ | 114 |
| Sutherland Paper Co. | 27¾ | 27¾ | 27¾ |
| Union Bag & Paper Corp. | 11⅞ | 10⅝ | 11¾ |
| United Paperboard Co. | 5½ | 5¼ | 5¼ |
| U. S. Gypsum Co. | 83 | 78½ | 81½ |
| U. S. Gypsum Co., pf. | 169½ | 169½ | 169½ |

**New York Curb Exchange**

High, Low and Last for the Week Ending December 6, 1939

| | High | Low | Last |
|---|---|---|---|
| American Box Board Co. | 8⅛ | 8⅛ | 8⅛ |
| Brown Co., pf. | 27¼ | 21½ | 26⅞ |
| Great Northern Paper | 41 | 40 | 41 |
| St. Regis Paper Co. | 2⅞ | 2½ | 2¾ |
| St. Regis Paper Co., pf. | 51½ | 51 | 51½ |
| Taggart Corp. | 5¼ | 4½ | 5⅛ |

### Abitibi Earns $544,627

[FROM OUR REGULAR CORRESPONDENT]

TORONTO, Ont., December 4, 1939—Earnings of Abitibi Power and Paper Company, Toronto, for October, prior to audit and charges for depreciation and bond interest, amounting to $544,627, compared with $463,529 in September, and with $370,117 in October, 1938. Shipments of newsprints in October, according to G. T. Clarkson, receiver and manager, amounted to 37,246 tons, compared with 32,694 tons in September, and 29,777 tons in October, 1938. Present indications in November will be about 37,500 tons, compared with 30,927 tons in November last year.

Shipments of sulphite pulp in October amounted to $5,193 tons, compared with 4,987 tons in September, 1939, and 3,874 tons in October, 1938. Present indications are that shipments of sulphite pulp in November will amount to about 5,000 tons, against 3,294 tons in November 1938.

### Crown Zellerbach Nets $3,662,982

The report of the Crown Zellerbach Corporation for the six months ended with October, shows a net profit of $3,662,982 after provision for taxes and other deductions. This is after a charge of $202,763, due to the revaluation of net current assets of Pacific Mills, Limited, a Canadian subsidiary, to the equivalent United States dollar value at current rate of exchange, and after providing in full for dividends on the preferred stock for the period.

For the similar period a year ago the net profit amounted to $2,338,608.

Sales for the six months of this year amounted to $27,736,702, compared with $24,725,448 in the six months ended on Oct. 21, 1938.

### Rayonier Earns $652,636

Rayonier, Inc., and wholly owned subsidiary, quarter ended October 31, reported a profit of $652,636 after taxes and charges, equal after preferred dividend requirements to 35 cents a share on 963,872 shares of common stock, compared with $64,894, or 10 cents a share on the preferred stock in the October quarter a year ago and $217,516, or 35 cents a share on the preferred in the July quarter this year. Six months ended Octoer 31, profit $870,152, or 25 cents on the common, against a loss of $118,370 in the like period a year ago.

### Schumacher Nets $51,090

Schumacher Wall Board Corporation for the quarter to October 31 reported a net income of $51,090, equal, after preferred dividends, to 54 cents each on 66,000 common shares, against $3,591, or 38 cents a common share, in preceding quarter and $40,001, or 39 cents a share, on common in the October quarter a year ago. Six months to October 31: net income, $90,681, or 94 cents a common share, against $73,943, or 69 cents a share, in the six months ended October 31, 1938.

### A. P. W. Co. Earns $21,085

The A. P. W. Paper Company, Inc. from July 1 to October 21 reported a net profit, subject to year-end audit of $21,085. No provision was included for the additional contingent interest of 1 per cent on first mortgage bonds, with warrants. Full interest has been accrued on the twenty-five-year 6 per cent convertible notes. For the quarter ended Sept. 30, 1938, company reported a net loss of $1,735.

### United Paperboard Loses $42,598

United Paperboard Company, Inc. and subsidiaries for the quarter to August 26, report a net loss of $42,598, contrasted with net profit of $13,501, equal to $1.04 each on 12,920 shares of 6 per cent preferred stock in the quarter ended August 27, 1938.

### S. D. Warren Votes $1 Dividend

The S. D. Warren Company has declared a divident of $1 a share. In the three preceding quarters of this year 50 cents each was disbursed.

# Paper and Paperboard Production in 1938

## Aggregate Tonnage Was 11,380,814 As Compared With 12,837,003 In 1937 and 11,975,552 In 1936 — Fourdriniers Were 885 and Cylinders 690 As Compared With 873 Fourdriniers and 687 Cylinders In Previous Year.

The sixth of a series of biennial reports for the even-numbered years alternating with the years covered by the biennial census of manufacturers has just been issued by the Bureau of the Census of the U. S. Department of Commerce, Washington, D. C.[1] The two series provide detailed production statistics for consecutive years. The questionnaires used for collecting the data for the even-numbered years are less detailed than those for the odd-numbered years, and consequently the figures for the several census years as given in table 1 are not in all cases strictly comparable.

### Paper-making Machines

The figures shown in table 3 in the "Number" columns indicate the kind of paper and board made principally on the respective machines, but in cases where one or more machines of the same type are used for producing two or more kinds of paper or board, the items in the "Capacity per 24 hours" columns were distributed according to the several kinds of paper and board made.

[1] A preliminary report was issued October 28, 1939.

TABLE I.—PAPER AND PAPERBOARD—PRODUCTION, BY KIND AND QUANTITY: 1938, 1937, AND 1936

| Kind | Quantity (tons, 2,000 pounds) 1938 | 1937 | 1936 |
|---|---|---|---|
| Aggregate | 11,380,814 | 12,837,003 | 11,975,552 |
| Newsprint, total | 832,331 | 975,854 | 938,287 |
| Standard (rolls and sheets) | 828,267 | (1) | (1) |
| Other (special grades) | 4,064 | | |
| Ground-wood printing and specialty papers, total | 435,651 | 518,332 | (1) |
| Hanging | 87,176 | 126,890 | 116,215 |
| Catalog | 91,782 | 100,974 | 82,576 |
| Other | 256,693 | 290,468 | (1) |
| Book paper, uncoated | 1,336,814 | 1,520,523 | 1,438,046 |
| Cover paper | 20,216 | 24,437 | 25,524 |
| Writing paper, total | 481,719 | 578,147 | 602,329 |
| Rag content | 69,468 | 78,367 | 84,945 |
| Sulphite bond | 304,282 | 332,229 | 355,258 |
| Other chemical wood-pulp | 107,969 | 167,551 | 162,126 |
| Wrapping paper, total | 1,865,856 | 2,053,387 | 1,879,323 |
| Sulphite | 367,104 | [2] 565,985 | 334,382 |
| Kraft | 1,216,030 | [2] 1,130,033 | 1,212,347 |
| All other | 282,722 | 357,369 | 332,594 |
| Tissue paper, total | 548,943 | 540,152 | 494,721 |
| Toilet | 264,380 | 254,221 | 220,920 |
| Towel | 104,951 | 93,284 | 93,056 |
| All other | 179,612 | 192,647 | 180,745 |
| Absorbent paper | 126,320 | 138,064 | 105,997 |
| Building paper | 570,454 | 608,086 | 549,701 |
| All other papers | 58,743 | 77,985 | [2] 288,196 |
| Paperboards, total | 5,103,767 | 5,802,036 | 5,454,637 |
| Container boards | 2,631,318 | 3,167,550 | 2,756,286 |
| Folding boxboards (bending) | 1,221,047 | 1,289,024 | 1,272,147 |
| Set-up boxboards (nonbending) | 608,867 | 720,310 | 700,769 |
| Binder's board | 34,241 | 51,913 | 58,004 |
| Cardboard | 47,371 | 51,318 | 108,499 |
| Bristol board | 52,223 | 73,539 | |
| Leatherboard | 18,355 | 27,174 | 23,375 |
| Pressboard | 10,199 | 8,623 | 11,229 |
| Building boards | 118,124 | 110,005 | 98,389 |
| Other boards | 362,022 | 302,580 | 425,939 |

[1] Data not available.
[2] Not strictly comparable with 1936 and 1938 because of change in classification in 1937.
[3] Including poster, news-tablet, lining, etc.

TABLE II.—PAPER AND PAPERBOARD—PRODUCTION, BY QUANTITY, BY STATES: 1938, 1937, AND 1936

[Statistics are presented in this table for each State for which separate figures can be published without disclosing the exact or approximate production reported by individual establishments. Larger quantities of paper and paperboard were, however, made in certain of the "Other Southern States" and "Other States" than in some of the States for which separate figures are given.]

| State | Quantity (tons, 2,000 pounds) 1938 | 1937 | 1936 |
|---|---|---|---|
| United States | 11,380,814 | 12,837,003 | 11,975,552 |
| California | 242,533 | 278,650 | 265,662 |
| Connecticut | 160,272 | 212,205 | 212,754 |
| Delaware | 35,314 | 36,389 | 25,521 |
| Florida | 273,048 | (1) | (2) |
| Illinois | 515,227 | 593,854 | 551,414 |
| Indiana | 183,547 | 295,981 | 280,569 |
| Louisiana | 468,808 | 533,977 | 513,304 |
| Maine | 882,171 | 1,038,775 | 981,810 |
| Maryland | 131,993 | 167,189 | 157,423 |
| Massachusetts | 439,499 | 514,039 | 494,058 |
| Michigan | 1,011,789 | 1,218,426 | 1,217,796 |
| Minnesota | 246,722 | 293,059 | 265,014 |
| New Hampshire | 140,739 | 158,924 | 152,547 |
| New Jersey | 626,274 | 640,207 | 637,398 |
| New York | 1,178,912 | 1,415,027 | 1,326,891 |
| North Carolina | 111,709 | (1) | 104,938 |
| Ohio | 827,340 | 1,037,884 | 947,222 |
| Oregon | 234,879 | 273,630 | 262,478 |
| Pennsylvania | 759,121 | 846,720 | 795,247 |
| Tennessee | 85,448 | 104,881 | 101,003 |
| Vermont | 70,700 | 82,071 | 76,858 |
| Virginia | 412,650 | 461,541 | 406,970 |
| Washington | 472,185 | 546,227 | 506,579 |
| West Virginia | 51,334 | 53,586 | 53,526 |
| Wisconsin | 882,445 | 940,867 | 892,681 |
| Other Southern States [3] | 798,267 | 938,378 | 745,889 |
| Other States [4] | 137,888 | 154,516 | |

[1] Withheld to avoid disclosing data for individual establishments; included in figure for "Other Southern States."
[2] Withheld to avoid disclosing data for an individual establishment; included in figure for "Other States."
[3] For 1938 and 1937: Alabama, Arkansas, Georgia, Mississippi, South Carolina, and Texas; in addition, Florida and North Carolina for 1937.
[4] For 1938 and 1937: District of Columbia, Iowa, Kansas, Missouri, and Rhode Island; in addition, Colorado for 1938 only.

TABLE III.—PAPER MACHINES, BY TYPE, NUMBER, AND CAPACITY, AND BY KIND OF PAPER MADE: 1938, 1937, AND 1936

| Kind of paper made | Total capacity per year of 310 days (Tons, 2,000 pounds) | Fourdrinier Number | Fourdrinier Capacity per 24 hours (Tons, 2,000 pounds) | Cylinder Number | Cylinder Capacity per 24 hours (Tons, 2,000 pounds) |
|---|---|---|---|---|---|
| Aggregate: | | | | | |
| 1938 | 16,191,300 | 885 | 29,616 | 690 | 22,614 |
| 1937 | 15,572,850 | 873 | 27,513 | 687 | 22,722 |
| 1936 | 14,458,090 | 864 | 25,122 | 669 | 21,517 |
| Newsprint: | | | | | |
| 1938 | 960,380 | 42 | 3,098 | ... | ..... |
| 1937 | 1,000,370 | 44 | 3,227 | ... | ..... |
| 1936 | 1,007,810 | 49 | 3,251 | ... | ..... |
| Ground-wood printing and specialty papers (hanging, catalog, novelnews, news tablet, etc.): | | | | | |
| 1938 | 597,060 | 54 | 1,926 | ... | ..... |
| 1937 | 557,070 | 53 | 1,797 | ... | ..... |
| 1936 | (1) | (1) | (1) | (1) | (1) |
| Book paper: | | | | | |
| 1938 | 1,977,490 | 216 | 6,374 | 1 | 5 |
| 1937 | 1,904,640 | 218 | 6,131 | 1 | 13 |
| 1936 | 1,837,680 | 202 | 5,922 | 1 | 6 |
| Cover paper: | | | | | |
| 1938 | 65,100 | 11 | 205 | 2 | 5 |
| 1937 | 40,300 | 9 | 123 | 2 | 7 |
| 1936 | 37,200 | 8 | 113 | 1 | 7 |
| Writing paper: | | | | | |
| 1938 | 676,110 | 132 | 2,181 | ... | ..... |
| 1937 | 757,020 | 141 | 2,442 | ... | ..... |
| 1936 | 728,810 | 144 | 2,340 | 1 | 11 |

TABLE III—*Continued*

| Kind of paper made | Total capacity per year of 310 days (Tons, 2,000 pounds) | Fourdrinier: Number | Fourdrinier: Capacity per 24 hours (Tons, 2,000 pounds) | Cylinder: Number | Cylinder: Capacity per 24 hours (Tons, 2,000 pounds) |
|---|---|---|---|---|---|
| Wrapping (or coarse) paper: | | | | | |
| 1938 | 2,303,560 | 200 | 7,596 | 40 | 480 |
| 1937 | 2,351,660 | 201 | 7,000 | 40 | 586 |
| 1936 | 2,180,850 | 201 | 6,625 | 35 | 410 |
| Tissue paper: | | | | | |
| 1938 | 668,980 | 114 | 1,732 | 70 | 426 |
| 1937 | 648,210 | 104 | 1,537 | 79 | 554 |
| 1936 | 640,770 | 114 | 1,673 | 73 | 394 |
| Absorbent paper: | | | | | |
| 1938 | 188,170 | 48 | 541 | 24 | 66 |
| 1937 | 180,420 | 42 | 522 | 25 | 60 |
| 1936 | 145,390 | 37 | 416 | 22 | 53 |
| Building paper: | | | | | |
| 1938 | 890,010 | 7 | 351 | 71 | 2,520 |
| 1937 | 859,630 | 8 | 375 | 63 | 2,398 |
| 1936 | 728,190 | 4 | 174 | 64 | 2,175 |
| All other paper: | | | | | |
| 1938 | 128,650 | 14 | 290 | 13 | 125 |
| 1937 | 105,400 | 9 | 191 | 13 | 149 |
| 1936 [2] | 639,530 | 72 | 1,922 | 16 | 141 |
| Boards: | | | | | |
| 1938 | 7,535,790 | 47 | 5,322 | 469 | 18,987 |
| 1937 | 7,168,130 | 44 | 4,168 | 464 | 18,955 |
| 1936 | 6,511,860 | 33 | 2,686 | 456 | 18,320 |

[1] Not shown separately. See footnote 2.
[2] Including catalog, hanging, poster, news-tablet, lining, etc.

## Pulpwood Consumption and Wood-Pulp Production

This report is one of a series of annual reports on pulpwood consumption and wood-pulp production in the United States, published by the Bureau of the Census in cooperation with the Forest Service, Department of Agriculture. [2]

### The Questionnaires

The questionnaires used in making the canvasses for the even-numbered years carry the following note: "Where pulp is consumed at mill and not sold, please state production cost or price charged to paper plant." The questionnaires used for the odd-numbered (biennial-census) years direct the manufacturers to report the estimated market value, f.o.b. mill. The value figures given for the several years in tables 4 and 5 are not, therefore, strictly comparable for all items.

[2] A preliminary report was issued September 15, 1939.

TABLE I.—PULPWOOD CONSUMPTION, BY QUANTITY AND COST, AND BY KIND OF WOOD, FOR THE UNITED STATES: 1938, 1937, AND 1936

| Kind of wood | 1938: Cords | 1938: Cost | 1937: Cords | 1937: Cost | 1936: Cords | 1936: Cost |
|---|---|---|---|---|---|---|
| Total | 9,193,991 | $74,433,181 | 10,393,800 | $82,884,799 | 8,715,916 | $67,161,447 |
| Yellow pine, Southern | 3,261,404 | 17,570,346 | 2,658,949 | 14,498,259 | 2,150,640 | 10,834,867 |
| Spruce: | | | | | | |
| Domestic | 1,447,457 | 17,249,767 | 2,010,720 | 21,980,698 | 1,756,977 | 18,516,891 |
| Imported | 832,295 | 11,822,410 | 826,528 | 10,743,365 | 735,305 | 9,052,878 |
| Hemlock: | | | | | | |
| Domestic | 1,677,181 | 11,124,455 | 2,264,565 | 15,749,172 [1] | 1,742,268 | 11,500,551 |
| Imported | 37,243 | 212,852 | 37,447 | 280,575 [1] | | |
| Poplar: | | | | | | |
| Domestic | 324,868 | 2,947,023 | 441,401 | 3,899,639 | 464,138 | 3,834,631 |
| Imported | 95,758 | 1,111,224 | 90,365 | 960,930 | 44,724 | 575,063 |
| Balsam fir: | | | | | | |
| Domestic | 321,984 | 3,446,131 | 320,715 | 3,269,690 | 365,189 | 3,480,867 |
| Imported | 65,392 | 731,128 | 71,447 | 767,243 | 81,383 | 866,410 |
| Jack pine, domestic and imported | 258,570 | 2,460,539 | 300,786 | 2,863,084 | [2] 289,538 | [2] 2,494,650 |
| Beech, birch, and maple, domestic and imported | 168,796 | 1,667,233 | [2] 257,410 | [2] 2,302,036 | [2] 118,461 | [2] 963,759 |
| White fir, domestic | 98,878 | 608,238 | [2] 135,384 | [2] 769,446 | 119,221 | 652,351 |
| Gum | 47,967 | 324,086 | [3] 25,967 | [3] 165,750 | 37,632 | 233,813 |
| Cottonwood | 40,996 | 257,069 | 64,035 | 432,366 | 58,749 | 417,747 |
| Tamarack (larch) | 9,937 | 80,735 | 8,945 | 84,057 | 10,005 | 85,347 |
| Other woods [4] | 274,105 | 2,006,656 | 313,745 | 2,115,411 | 411,851 | 2,309,443 |
| Slabs and mill waste | 231,160 | 813,289 | 565,391 | 2,003,078 | 329,835 | 1,342,179 |

[1] Domestic only.
[2] Domestic and imported.
[3] Red gum.
[4] For 1938, domestic ash, basswood, cherry, chestnut, Douglas fir, elm, hickory, oak, sycamore, willow, yellow poplar, and miscellaneous hardwoods. For earlier years, see published reports.

TABLE IV.—WOOD-PULP PRODUCTION, BY QUANTITY AND VALUE, BY PROCESS, FOR THE UNITED STATES: 1938, 1937 AND 1936

[The value figures for the several census years as given in this table are not strictly comparable for all items.]

| Process | 1938: Quantity (tons, 2,000 pounds) | 1938: Value (f.o.b. mill) | 1937: Quantity (tons, 2,000 pounds) | 1937: Value (f.o.b. mill) | 1936: Quantity (tons, 2,000 pounds) | 1936: Value (f.o.b. mill) |
|---|---|---|---|---|---|---|
| Aggregate | 5,933,560 | $180,394,204 | 6,572,918 | $225,573,125 | 5,695,219 | $165,272,519 |
| Mechanical, total | 1,333,308 | 24,507,924 | 1,600,667 | 30,315,251 | 1,475,620 | 25,381,285 |
| Not steamed | 1,264,544 | 23,273,725 | 1,513,047 | 28,281,135 | 1,414,091 | 24,304,147 |
| Steamed | 68,764 | 1,234,199 | 87,620 | 2,034,116 | 61,529 | 1,077,138 |
| Sulphite fiber, total | 1,606,476 | 78,079,147 | 2,140,244 | 109,920,115 | 1,821,842 | 77,190,691 |
| Unbleached, total | 601,855 | 21,303,522 | 791,575 | 30,718,426 | 693,903 | 22,486,897 |
| Bleached, total | 1,004,621 | 56,775,625 | 1,348,669 | 79,201,689 | 1,127,939 | 54,703,794 |
| Superpurified | 77,193 | 5,650,868 [1] | 353,640 [1] | 23,871,039 [1] | 108,600 | 6,347,853 |
| Rayon and special chemical grades | 151,068 | 12,704,006 [1] | | | 198,994 | 11,446,079 |
| Other bleached | 776,360 | 38,420,751 | 995,029 | 55,330,650 | 820,345 | 36,909,862 |
| Sulphate fiber, total | 2,443,051 | 57,694,035 | 2,139,087 | 59,437,736 | 1,794,734 | 42,122,178 |
| Unbleached | 2,122,538 | 45,544,782 | 1,923,937 | 51,096,623 | 1,639,153 | 36,482,163 |
| Bleached | 320,513 | 12,149,253 | 215,150 | 8,341,113 | 155,581 | 5,640,015 |
| Soda fiber, bleached, total | 395,307 | 18,062,562 | 507,548 [2] | 23,465,719 [3] | 557,695 [2] | 20,148,594 [3] |
| Semichemical and other wood pulp, total | 118,544 | 1,677,716 | 132,521 | 1,748,316 [3] | | |
| Screenings, total | 36,874 | 372,820 | 52,851 | 685,988 | 45,328 | 429,771 |
| Mechanical | 4,215 | 31,689 | 9,674 | 69,667 | 7,357 | 51,158 |
| Chemical | 32,659 | 341,131 | 43,177 | 616,321 | 37,971 | 378,613 |

[1] Combined to avoid disclosing data for an individual establishment.
[2] Includes a small quantity of unbleached pulp.
[3] Soda fiber, bleached and unbleached, and semichemical only. Combined to avoid disclosing data for individual establishments.

TABLE II.—PULPWOOD CONSUMPTION—QUANTITY, BY PROCESS OF MANUFACTURE, FOR THE UNITED STATES: 1938, 1937 AND 1936

| Process | 1938 Cords | 1938 Per cent of total | 1937 Cords | 1937 Per cent of total | 1936 Cords | 1936 Per cent of total |
|---|---|---|---|---|---|---|
| Total | 9,193,991 | 100.0 | 10,393,800 | 100.0 | 8,715,916 | 100.0 |
| Mechanical | 1,219,306 | 13.3 | 1,479,502 | 14.2 | 1,365,913 | 15.7 |
| Sulphite | 3,090,046 | 33.6 | 4,318,029 | 41.5 | 3,483,681 | 40.0 |
| Sulphate | 4,025,540 | 43.8 | 3,561,781 | 34.3 | 2,939,982 | 33.7 |
| Soda | 718,172 | 7.8 | 892,804 | 8.6 | 795,981 | 9.1 |
| Semichemical | 140,927 | 1.5 | 141,684 | 1.4 | 130,359 | 1.5 |

TABLE III.—WOOD-PULP PRODUCTION—QUANTITY, BY PROCESS OF MANUFACTURE, FOR THE UNITED STATES: 1938, 1937 AND 1936

| Process | 1938 Tons of 2,000 pounds | 1938 Per cent of total | 1937 Tons of 2,000 pounds | 1937 Per cent of total | 1936 Tons of 2,000 pounds | 1936 Per cent of total |
|---|---|---|---|---|---|---|
| Total [1] | 5,933,560 | 100.0 | 6,572,918 | 100.0 | 5,695,219 | 100.0 |
| Mechanical [1] | 1,337,523 | 22.5 | 1,610,341 | 24.5 | 1,482,977 | 26.0 |
| Sulphite [1] | 1,630,110 | 27.5 | 2,174,974 | 33.1 | 1,851,099 | 32.5 |
| Sulphate [1] | 2,452,076 | 41.3 | 2,144,728 | 32.6 | 1,803,448 | 31.7 |
| Soda | 395,307 | 6.7 | 510,354 | 7.8 | | |
| Semichemical and other wood pulp | 118,544 | 2.0 | 132,521 | 2.0 | 557,695 [2] | 9.8 |

[1] Includes data for screenings as follows: 1938, mechanical, 4,215 tons; sulphite, 23,634 tons; and sulphate, 9,025 tons. For earlier years, see published reports.
[2] Soda and semichemical only. Combined to avoid disclosing approximations of production by individual establishments.

TABLE V.—WOOD-PULP PRODUCTION—AVERAGE VALUE PER TON, FOR THE UNITED STATES: 1938, 1937 AND 1936

[The figures for the several years as given in this table are not strictly comparable for all items.]

| | 1938 | 1937 | 1936 |
|---|---|---|---|
| Mechanical: | | | |
| Not steamed | $18.40 | $18.69 | $17.19 |
| Steamed | 17.95 | 23.22 | 17.51 |
| Sulphite: | | | |
| Unbleached | 35.40 | 38.81 | 32.41 |
| Bleached, total | 56.51 | 58.73 | 48.50 |
| Superpurified | 73.20 | (1) | 58.45 |
| Rayon and special chemical grades | 84.09 | (1) | 57.52 |
| Other bleached | 49.49 | 55.61 | 44.99 |
| Sulphate: | | | |
| Unbleached | 21.45 | 26.56 | 22.26 |
| Bleached | 37.91 | 38.77 | 36.25 |
| Soda, bleached | 45.69 | (2) | 41.93 [2] |
| Semichemical and other wood pulp | 14.15 | 13.19 | 11.60 [4] |

[1] Superpurified and rayon and special chemical grades, $67.50. Combined to avoid disclosing data for individual establishments.
[2] Soda, unbleached and bleached, $46.23.
[3] Soda, unbleached, $34.00.
[4] Semichemical only.

TABLE VI.—PULPWOOD CONSUMPTION, BY QUANTITY AND COST, AND WOOD-PULP PRODUCTION, BY QUANTITY AND VALUE, BY STATES: 1938

[Statistics are presented in this table for each State for which separate figures can be published without disclosing the exact or approximate production reported by individual establishments. Larger quantities of pulpwood and wood-pulp were, however, reported from certain other States than from some of the States for which separate figures are given.]

| State | Wood consumed: Cords | Wood consumed: Cost | Pulp produced: Tons of 2,000 pounds | Pulp produced: Value |
|---|---|---|---|---|
| United States | 9,193,991 | $74,433,181 | 5,933,560 | $180,394,204 |
| Northeastern and Central States, [1] total | 2,376,534 | 27,948,652 | 1,732,011 | 59,981,771 |
| Maine | 1,058,076 | 11,681,607 | 847,317 | 23,349,032 |
| New Hampshire | 262,233 | 2,783,853 | 133,188 | 8,908,094 |
| New York | 526,484 | 7,539,303 | 427,024 | 14,233,120 |
| Pennsylvania | 283,886 | 3,756,020 | 165,098 | 8,028,415 |
| Vermont | 15,921 | 184,523 | 16,552 | 345,970 |
| Other Northeastern and Central States [2] | 229,934 | 2,003,346 | 142,832 | 5,117,140 |
| Lake States, total | 1,496,478 | 16,455,744 | 934,510 | 35,897,850 |
| Michigan | 270,690 | 2,886,391 | 177,870 | 6,454,374 |
| Minnesota | 255,399 | 2,595,416 | 170,748 | 5,521,572 |
| Wisconsin | 970,389 | 10,973,937 | 585,892 | 23,921,904 |
| Southern States, [3] total | 3,528,734 | 19,057,888 | 2,179,292 | 48,601,980 |
| Florida | 487,235 | 2,796,397 | 316,754 | 5,564,742 |
| Louisiana | 722,559 | 3,209,529 | 454,211 | 9,571,845 |
| North Carolina | 366,144 | 2,336,806 | 199,342 | 6,503,908 |
| Virginia | 559,277 | 3,455,709 | 334,869 | 8,829,734 |
| Other Southern States [4] | 1,393,519 | 7,259,447 | 874,116 | 18,131,751 |
| North Pacific States, total | 1,792,245 | 10,970,897 | 1,087,747 | 35,912,603 |
| Oregon | 342,229 | 2,382,005 | 250,788 | 5,759,628 |
| Washington | 1,450,016 | 8,588,892 | 836,959 | 30,152,975 |

[1] Including Tennessee and West Virginia.
[2] Maryland, Massachusetts, Ohio, Tennessee, West Virginia.
[3] Not including Tennessee nor West Virginia.
[4] Alabama, Arkansas, Georgia, Mississippi, South Carolina, Texas.

## Good Demand in Indianapolis

[FROM OUR REGULAR CORRESPONDENT]

INDIANAPOLIS, Ind., December 4, 1939—Business in the paper field last week continued good with every prospect of larger volume before the holidays. One source of encouragement was from the continued large number of inquiries. It is evident now that demand will hold past the first of the year and perhaps past that point. Local jobbers are holding their buying to immediate needs and will continue this practice until after inventory at least. Every effort is being made to keep stocks as low as is consistent and yet keep them well balanced.

Prices on sulphites and other grades of fine paper are firm and there is no indication of change. Reports from advertising agents and the larger printers are that a good volume of direct mail advertising is due for both holiday and after-holiday buying. A large amount of catalogue work also is in prospect and some of it now is being purchased.

The newsprint situation is unchanged but the smaller papers are using more volume. Holiday advertising already is large and both small and large papers are increasing their lineage. The domestic advertising is expected to run considerably more this year than a year ago.

The container field continues good with manufacturers working almost to production capacity. No effort is being made to build up warehouse stocks, but the continued demand is keeping the different factories in production. Building paper demand slumped badly the last week with the coming of bad weather and little is expected until the spring season opens up. Most dealers have adequate stocks, but they will let these dwindle as much as possible before the first of the year.

A fair market is reported for rags and waste paper with prices on better grades of both in fair shape. There seems to be little mill demand for low grades of either rags or paper. Stocks in local warehouses are rather large for this time of the year.

## Control in Lindley Box Co. Sold

INDIANAPOLIS, Ind., December 4, 1939—Controlling interest in the Lindley Box and Paper Company of Marion, Ind., was obtained last Friday by the purchase of 2,571¼ shares of stock in the company, sale of which was approved by Judge S. M. Chambers of the local probate court. The name of the purchaser was not disclosed.

The stock was sold by the Union Trust Company of Indianapolis, which had the shares in trust for heirs of the late Lee Lindley of Marion. Charles N. Fultz, trust officer, said 4,700 additional shares of common stock also were disposed of by the heirs. The purchaser paid $30 a share, he said.

## William D. Harper Dead

William D. Harper, head of the paper distributing firm of W. D. Harper, Inc., of 225 Fourth avenue, New York, died December 2 at his home, 117 West Fifty-eighth street, after a long illness. His age was 75 years.

Mr. Harper came from a family long associated with the publishing business. His grandfather, Fletcher Harper, was one of four brothers who founded the publishing house of Harper Brothers, and most of the members of that family, including those of Mr. Harper's generation, went into the firm.

He stayed, however, in the paper business, devoting himself to that and to the science of preserving records through the use of permanent paper.

He was influential in developing many of the finest grades of rag-content paper for use in insurance policies and other purposes where a permanent record was desired. This led him into the book and newspaper fields, and in 1927 he developed, for The New York *Times*, the first really permanent workable all-rag newsprint paper, and the permanent editions of The New York *Times* have been printed on that paper since then.

He was also interested in the preservation of such collections as the Hoover War Memorial Library.

Mr. Harper was born in Yonkers, N. Y. He attended public school in New York and prepared for college at the Hopkins Grammar School in New Haven, and afterward took a special course in chemistry at Columbia University.

Mr. Harper's business career started with the firm of A. H. Vernam & Company, in Wall street, but after two years there he formed the firm of W. H. Haight & Harper, Dry Goods Converters. After being in this business for three years, he joined the firm of J. H. Bonnell, manufacturers of printing ink, as a partner.

In 1911 Mr. Harper went into the paper business, under the name of W. D. Harper & Company, and he incorporated the firm under its present name in 1913. He had been president of the company ever since.

Mr. Harper was a member of the Union League Club. He was for many years a leading member of the Amateur Comedy Club.

Surviving are his widow, Mrs. Tacie Belle McDonald Harper, whom he married in 1884 and three step-daughters, Miss Clara McDonald Harper, who lived with her parents at the Sevillia Apartments, 117 West Fifty-eighth street; Mrs. Buchanan Houston of Scarborough, N. Y., and Mrs. Edward Wells of Northhampton, Mass.

Funeral services were held December 3 in the chapel of Riverside Church. Burial was private.

## Dr. H. P. Bassett Killed by Auto

PHILADELPHIA, Pa., November 28, 1939 — Dr. Harry Preston Bassett, age 61, a widely known chemical engineer, was killed by an automobile driven by a woman as he crossed Baltimore avenue at 56th street shortly before two o'clock on Friday morning, November 24. He had spent the evening in his research laboratory at 1138 S. Cecil street, near 57th street and Baltimore avenue, and was on his way to his home at 3929 Pine street.

Dr. Bassett was born in Kentucky and was graduated from Kentucky State College and Johns Hopkins University. He came to Philadelphia in 1918 and since 1920 has been associated with Meigs, Bassett & Slaughter, Inc., having been president for the past several years. This company has offices in the Drexel Building. During the World War he was doing research work for the Hercules Powder Company when the chemicals he was using exploded. Dr. Bassett lost the sight of one eye in the accident.

At various times he was associated with the E. I. DuPont de Nemours & Co., the General Electric Company and other large corporations. He also was once connected with the U. S. Department of Agriculture.

He contributed numerous articles to chemical publications and was a member of the American Chemical Society, the American Institute of Chemical Engineers and the Chemists' Club of New York, also of Saint Andrew's Lodge No. 18, F. & A. M., of Cynthiana, Ky., and of Keystone Chapter No. 5, Auvergne Commandery No. 2 K. T., Scottish Rite Bodies, and El Zagal Temple, A.A.O.N.M.S., of Fargo, N. D.

During the World War he was engaged in the synthetic development of toluene for war purposes and since has been regarded as a expert on the properties and development of cellulose. He was unmarried and had an apartment at the Pine street house for the past 17 years.

The funeral was held from the Smith Reese Funeral Home, at Cynthiana, Kentucky, at two-thirty on Monday, November 27.

## Buys North Tonawanda Plant

[FROM OUR REGULAR CORRESPONDENT]

BUFFALO, N. Y., November 27, 1939—The American Box Board Company of Grand Rapids, Mich., has purchased the North Tonawanda factory formerly occupied by the R. G. Kittinger Shops, Inc., where it will manufacture corrugated containers and other products.

The company ranks among one of the largest manufacturers of fiber and straw board containers in the country, with annual sales in excess of $2,000,000. It plans to develop the North Tonawanda plant as an eastern base for its manufacturing and distribution operations.

Officers of the American Box Board Company are: President and general manager, Marcus B. Hall; vice president and treasurer, Walter S. Goodspeed, and secretary, Harrison L. Goodspeed.

## Scott Paper Co. Completes New Unit

Thomas B. McCabe, president of Scott Paper Company, has announced that its ninth and newest papermaking unit and auxiliary finishing equipment are now in production. A new filter plant, also part of the $1,750,000 plant expansion program begun last June, is rapidly nearing completion.

"This is the third extensive plant expansion program which Scott Paper Company has completed within the last two years," Mr. McCabe said. "The first in December, 1937, involving an expenditure of $1,700,000; the second, requiring an expenditure of over $2,800,000, was completed in February of this year. These two additions to plant and production facilities increased the company's potential papermaking capacity about 40 per cent."

# CHEMICAL INDUSTRIES HOLD EXPOSITION

*(Continued from page 15)*

Bartlett, special representative; Representatives of the New York office were, P. R. Berryman, manager, New York Branch, J. A. Dwyer, district manager, A. B. Johndrow, sales manager, and special representatives J. F. Lee, J. W. Greene, and John Tancred.

### Dorr Co.

The Dorr Company occupied its regular space on the main floor which was devoted to an exposition of the company's work in the handling and treating of finely divided solids suspended in liquids. A central theme piece, consisting of spheres dropping through lucite tubes filled with a viscous liquid, dramatized the three unit operations of thickening, classification and agitation, and the application of these to practice will be illustrated by a dozen scale working models.

Many common industrial operations were illustrated with illuminated flowsheets on the wall; and the work of the Westport Mill, the company's laboratories and test plans at Westport, Conn., will be feaured prominently at one end.

### Electro Bleaching Gas Co.

Unique figures of pioneer characters, sculptured in metal by the late L. L. "Tony" Balcom and symbolic of the pioneering activities of the two affiliated companies, were displayed by the Electro Bleaching Gas Company—Niagara Alkali Company, on the main floor. The central figure was of a western plainsman with long rifle. Other figures are reproduced in photographs illuminated from behind to create a three-dimensional effect. Underneath these figures in a recessed section reaching across the back of the booth are EBG-Niagara products highlighted in museum jars—Liquid Chlorine, Carbonate of Potash, Caustic Soda, Caustic Potash and Paradichlorobenzene.

Representatives in attendance were, W. J. Weed, manager of sales, J. E. Ferris and T. C. Keeling.

### Foxboro Co.

The new Time-Set Potentiometer-Stabilog System was featured at the booth of The Foxboro Company, Foxboro, Mass., on the main floor. Ten models of instruments, available for air-operated control and for electric-operated control were displayed. Also of particular interest was an explosion proof motor, a standard Foxboro explosion—resistant motor safely located in an explosion-proof housing on rear of instrument case. The company's Potentiometer Multiple Recorder, while not a new instrument, was displayed in operation, without a case, to reveal all the working parts.

Engineers from the Company's head office, at Foxboro, Mass., in attendance included: C. Schwarzler, N. F. Murphy, J. B. McMahon, S. C. Horn and W. H. Kidd. Representatives from the branch office in New York City were: C. C. Fuller, K. L. Barton, R. A. Rockwell, J. H. Collins, R. W. McWhood, F. S. Walter, T. B. Burris, R. E. Rogers and H. E. Everett.

### General Electric Co.

General Electric Company exhibited on the main floor, a complete line of motors and control, featuring the splashproof motor and the cut-away motors of the totally-enclosed fan-cooled direct-current type. The new AE1A air circuit breakers; Flamenol insulated wire, the Formex magnet wire, and the No. 1799 varnished cambric and Glyptal wire; a complete line of operating meters and instruments, including the hydrogen purity indicator, viscosimeter, mercury vapor detector, potentiometer and the luximeter, and the thickness gauge; also operating will be the Reactrol system of furnace control, a new type of temperature control for electric furnaces; several pieces will be taken from the New York World's Fair, General Electric "House of Magic" as an added attraction to the booth. One of these exhibits will be the popular floating dish which has been viewed by thousands both here and on the West Coast.

Representatives in attendance were: J. J. Huether, C. W. Bowman, H. A. Jones, R. B. Hanna from Schenectady, and W. W. Jones and J. J. Pascher from New York.

### Grinnell Co.

On display at the exhibit of the Grinnell Company, Providence, R. I., on the second floor were cast and malleable iron fittings, Thermoflex traps, welding fittings, rubber lined pipe and fittings, unions, Thermolier unit heaters and Genspring pipe hangers. The Grinnell Automatic Thermolier and Marine Type H14 Genspring Hanger was on display for the first time.

H. A. Keene, D. A. Johnson and A. F. Van Eck, and other representatives from New York and Providence were in attendance.

### Haveg Corp.

The Haveg Corporation, Newark, Del., subsidiary of the Continental Diamond Fibre Company, featured the Haveg Pilot Plant, a model displaying this process and plant units for the first time in public. Some of the important steps of this process consist of fibrous raw material digested with hot 15 per cent hydrochloric acid heated in a Tantalum Bayonet heater, the vapor passing into the reflex condenser. The operation of the suction filter unit, filters the material free from acid, which is recovered and returned to the receiver unit. The cake of filtered material remaining is washed and neutralized before discarding. When free from hydrochloric acid, the charge is removed from the filter and dried in the conventional manner.

### Hercules Powder Co.

Exhibits of the major Hercules products, each coupled with a series of natural color transparencies graphically showing the major uses of the products displayed, were shown by the Hercules Powder Company, Wilmington, Del., on the main floor. There were eight display sections, each devoted to a single phase of Hercules operations. Included was rosin, pine oil, terpene chemicals, cotton linters, nitrocellulose, cellulose acetate, ethyl cellulose, and a model of the Hercules Experiment Station. The displays were fully captioned and lighted in sequence, so that the eye will be able to view each series of transparencies in logical order. Other products were displayed inside the booth.

Technical representatives of the company's departments were present to confer with visitors.

### International Nickel Co.

Products in which Monel, Nickel and Iconel were used in the equipment of manufacture, were a feature at the booth of The International Nickel Company, 67 Wall street, New York, on the main floor. Some of the products and paper manufacturers using International metals included kraft paper from the Southern Kraft Corporation, waxed paper from the Minerva Paper Mills, tissue paper from the Sanitary Paper Mills, and book paper from the Oxford Paper Company.

### Jeffrey Manufacturing Co.

The exhibit of The Jeffrey Manufacturing Company, Columbus, O., on the main floor included a section of a Jeffrey-Traylor vibrating Dryer and Cooler. A Jeffrey-Traylor electric vibrating Waytrol, operating in connection with dial scale was shown. Other equipment displayed included Jeffrey-Traylor electric vibrating spreading feeders, Jeffrey-Traylor electric vibrating Screen, with Heller stainless wire cloth, and the Jeffrey Mass-Flo conveyor-elevator.

H. J. Flint, sales manager of the Jeffrey-Traylor Division, was in charge of the Jeffrey Booth.

### Johns-Manville Corp.

A variety of an extensive line of building and industrial products was displayed at the booth of the Johns-Manville Corporation, 20 East 40th street, New York, on the main floor. Among the products of particular interest to the paper and pulp industry was "Celite" filter aids, for the clarification of liquids, such as black and white liquors. "Celite" mineral fillers for high increase color and for the control of pitch trouble were also shown, together with non-corrosion pipe.

### Leeds & Northrup Co.

A Micromax $SO_2$ Recorder or Controller exhibited a new L & N Optical Pyrometer and the L & N Electro-Chemograph are new products by the Leeds & Northrup Company, 4901 Stenton avenue, Philadelphia, Pa., on the main floor.

*Micromax $SO_2$ Control* or Recorder features an entirely new combination of filter and gas analysis cell. The filter is said to be extremely efficient and to require no attention. The cell is entirely glass-coated inside, presenting no exposed metal and is said to be corrosion-proof.

The $SO_2$ damper may be operated either pneumatically or electrically. Control in the past has been electric; pneumatic is offered simply to meet individual preferences.

The L & N Optical Pyrometer is said to be entirely new; and the only potentiometer-type optical for industrial use. It is calibrated in degrees. Its optical system is more easily sighted than in the older L & N instrument, and the complete pyrometer weighs one-third less than the older model.

The Electro-Chemograph is described as a convenient instrument for recording the current and potential relationships of the dropping-mercury electrode. The features of the Electro-Chemograph are said to be: (1) Record is an ink-drawn curve from a Micromax Pyrometer; no photographic charts; no dark-room; no developing and printing; analysis is available as test proceeds. (2) I-R drop through the current-measuring device (the Micromax Recorder) does not affect the accuracy of the applied potential. (3) Instruments are standard types, widely used for other purposes, highly accurate, extremely sturdy.

### Oliver United Filters, Inc.

The Oliver Precoat Filter was featured in scale models at the booth of Oliver United Filters, Inc., 33 West 42nd street, New York, on the main floor. These filters are constructed for either continuous vacuum or continuous pressure service, eliminate the manual handling of filter cake and provide the desired clarity in one step. The unusual feature of this filter is a moving knife edge, geared to travel inwardly at an extremely low rate. It shaves off continuously the deposited solids plus an extremely thin section of the filter medium. Clarification continues uninterruptedly for periods ranging to a week or more but precoating usually requires less than one hour.

### Taylor Instrument Companies

Indicating, controlling and recording instruments for temperature, pressure, humidity, flow and liquid level were shown by the Taylor Instrument Companies, Rochester, N. Y., on the main floor. Taylor instruments on display included automatic temperature control; test instruments; pyrometers; recording instruments; temperature and pressure regulators; etched stem industrial scale thermometers; temperature, pressure, flow, liquid level and humidity controllers; pressure, absolute pressures, vacuum, volumetric pressure gauges and flow meters. A working model of a time schedule controller was the feature of the exhibit.

### Timken Roller Bearing Co.

A novelty unit, displaying a tube .0005-inch in diameter and a section of steel under polarized light, was shown at the exhibit of The Timken Roller Bearing Company, Canton, O., on the third floor. The exhibit consisted of a series of ten Timken tubes, set side by side on end, and ranging from ½-inch in diameter to 8⅝-inch in diameter. They will be 7¼-inch high and the tops sliced at an angle of 45 degrees. An adjustable magnifying glass, mounted on a movable truck, will enable visitors to more closely examine the surface of the tubes.

Representatives in attendance were: H. C. McCollum, chief chemist; S. D. Williams, director of sales; A. R. Adelberg, Eastern sales manager; J. M. Gotshall, chemist, and Ben H. Miller.

### Westinghouse Electric & Mfg. Co.

The Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., occupied booths on the second floor, and displayed the following:

(1) Oil immersed motor starters and panelboards for use in hazardous atmospheres. (2) Explosion resisting motor. (3) Sectionalized totalling enclosed motor. (4) Small steam turbine. (5) Ignition rectifier in operation under load. (6) Rectox rectifier for low boltage plating. (7) Latest type industrial lighting—fluorescent. (8) Regular line of motor starters, pushbuttons, small circuit breakers. (9) Gearmotor. (10) A new type air circuit breaker. (11) Micarta for use in the industry.

Among those in attendance were: C. C. Levy, and I. H. Coen of the Industrial Engineering department, East Pittsburgh; L. A. Casanova, Rectifier Division, East Pittsburgh; Harry Grunnagle, advertising department, East Pittsburgh; Harry Vidal, industrial sales manager, New York office of Westinghouse; and Edward A. Laing, sales promotion manager, New York office.

Improved!

# BELOIT HORIZONTAL Dual Press

PATENTS PENDING

● The Beloit Horizontal Dual Press has been improved by incorporating a primary roll over the first suction press, adding another nip. Thus, this press is now equivalent to three presses instead of two, the first suction roll doing double duty.

● The success of the Beloit Horizontal Dual Press has been definitely established. This new press gives even better results.

**THE BELOIT WAY** BELOIT IRON WORKS PAPER MACH'Y BELOIT WIS. **IS THE MODERN WAY**

BELOIT IRON WORKS BELOIT WISCONSIN

# Government Paper Bids and Awards

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., December 6, 1939—The Government Printing Office has announced the following paper awards.

### Paper Awards

Stanford Paper Company will furnish 233,544 pounds (877,780 sheets) of 50 per cent rag, 37 x 47½ ledger paper at 10.05 cents. Aetna Paper Company will furnish 28,050 pounds (300,000 sheets) of 32 x 42 pink sulphite writing paper at 6.69 cents. Bids for both of these items were received on November 13.

Barton, Duer & Koch Paper Company will furnish 29,500 pounds of 24 x 30 orchid cardboard at $27.90 per M sheets and the same firm will also furnish 18,000 sheets of 22 x 28 buff cardboard at $42.75 per M sheets. Bids for these items were received on November 8.

Mudge Paper Company wil furnish 5,000 pounds of No. 1 gummed kraft paper in 24 inch rolls at 7.1 cents and Marquette Paper Company will furnish 104,700 pounds (600,000 sheets) of 38 x 48 white sulphite bond paper at 5.645 cents. Bids for these items were received on November 8.

Middlesex Products Corp. will furnish 35,000 sheets of 24 x 36 white cloth lined paper at $86.00 per M sheets, bids for which were received on November 6.

Russell Products Company will furnish 500 pounds of facing stero tissue paper in 24 inch rolls at 6.75 cents, bids for which were received on October 30.

Barton, Duer & Koch Paper Company will furnish 18,000 sheets of 22 x 28 buff cardboard at $42.75 per M sheets. Whitaker Paper Company will furnish 4,250 sheets of 20 x 25 blue gummed paper at $7.75 per M sheets.

Aetna Paper Company will furnish 28,050 pounds of 32 x 42 pink sulphite writing paper at 6.69 cents. Barton, Duer & Koch Paper Company will furnish 6,600 pounds of 50 per cent rag, white bond paper at 16 cents.

### Paper Bids

The Printing Office has received the following bids for 42,000 pounds (500,000 sheets) of 24½ x 32 green mimeograph paper; Cauthorne Paper Company, 5.5 cents; Barton, Duer & Koch Paper Company, 6.59 cents; Marquette Paper Company, 5.98 cents; and Mathers Lamm Paper Company, 5.986 cents.

For 5,000 pounds (200,000 sheets) of 100 per cent rag, 21 x 32 white manifold paper; Barton, Duer & Koch Paper Company, 27.5 cents; Whitaker Paper Company, 29.45 cents; Mudge Paper Company, 29.2 cents; R. P. Andrews Paper Company, 31.25 cents; Stanford Paper Company, 29.65 cents; and Mathers-Lamm Paper Company, 50.87 cents.

For 176,245 pounds (1,020,000 sheets) of 34 x 48 white sulphite bond paper; Barton, Duer & Koch Paper Company, 5.96 cents; Mudge Paper Company, 5.96 cents; Stanford Paper Company, 6.25 cents; R. P. Andrews Paper Company, 5.96 cents; and Marquette Paper Company, 5.78 cents.

For 19,890 pounds (90,000 sheets) of 50 per cent rag, 40½ x 42½ lithograph finish map paper; Stanford Paper Company, 10.19 cents; Graham Paper Company, 11.62 cents; R. P. Andrews Paper Company, 11.57 cents; Barton, Duer & Koch Paper Company, 10.38 cents; Mathers-Lamm Paper Company, 10.5 cents; Whitaker Paper Company, 10.3 cents; and Mudge Paper Company, 10.14 cents.

For 1,680 sheets of 20 x 25 green gummed paper; Mudge Paper Company, $10.90 per M sheets; Virginia Paper Company, $13.50; and Stanford Paper Company, $11.50.

For 2,000 sheets of 20 x 48 glazed paper; Mathers-Lamm Paper Company, $12.50 and $13.00 per M sheets; Mudge Paper Company, $15.11 and $15.56.

## Will Continue to Accept Rags

A statement released jointly by the National Association of Waste Material Dealers, Inc. and the New York Association of Dealers in Paper Mills' Supplies, Inc. on Tuesday, November 28th, was to the effect that the New York, New Haven and Hartford Railroad had filed a sixth section application with the Interstate Commerce Commission withdrawing the restrictions against the acceptance of Waste Paper and Rags at Piers 38, 39, 40 and 41 East River and Pier 14, North River, which restriction was first brought to the attention of the Trade in the New Haven's Supplement No. 62 to its ICC Tariff F 3125 which would have so changed Rules 15 and 17 as to have prevented the delivery of Rags and Waste Paper at the above mentioned Piers.

When this petition is granted amended tariffs will be issued, discontinuing the restriction on the loading at the above mentioned Piers. In the meantime through the efforts of the two above mentioned Associations, the restrictions already had been suspended by the Commission until May, 15, 1940.

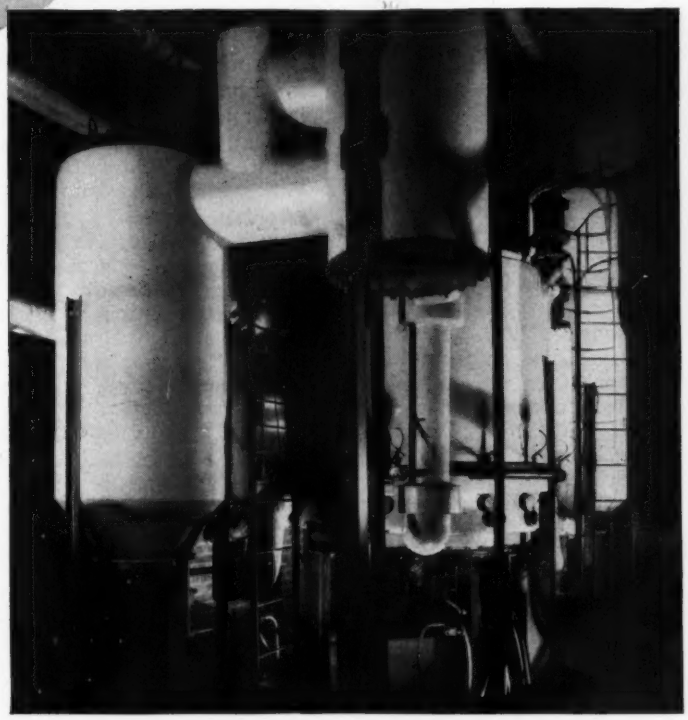
What promised to be a long, expensive fight to protect the interests of New York Rag and Waste Paper shippers has been avoided through a willingness of the New York, New Haven and Hartford officials to cooperate with their important New York shippers and the Associations which represent them.

In the negotiations which terminated so satisfactorily the National Association of Waste Material Dealers, Inc. was represented by its managing director, Charles M. Haskins, while the New York Association of Dealers in Paper Mills' Supplies, Inc. was represented by Walter H. Martens, chairman of that association's Transportation Committee. Charles J. Browne, commerce counselor, 217 Broadway, New York, represented the two above mentioned associations and also the American Cotton Waste Exchange. The case was to have been heard before the Interstate Commerce Commission on December 6.

Acknowledgment has been made by both of the above mentioned associations for the cooperation received from N. F. Bartlett, traffic manager of Hollingsworth & Vose Company, Boston, Mass. Samuel Hershman of I. Hershman & Co., Inc. of New Haven, Conn. and a group of Metropolitan dealers who came to the assistance of those in charge of the case.

# REICHHOLD

## SYNTHETIC RESINS



## THE MODERN WAY TO HEAT SEAL PAPER

Paper makers are looking to synthetic resins for more and better ways of treating their product.

Take heat seal coatings, for instance. The development of new synthetic resins makes possible heat seal coatings which simplify factory handling by allowing the use of automatic machinery. A local elevated temperature and mild pressure quickly and firmly seal the treated paper. This same paper, when stacked and stored at temperatures as high as 120° F., does not become tacky. This process is also protection against moisture, grease and other penetrating substances.

This is but one example of synthetic resins' applications in the paper industry. Clearer, paler overprint varnishes and lacquers, more efficient coatings and better sizings are others. In all these developments Reichhold is playing a leading part. Its research staff has won an enviable reputation for this institution throughout the industry. And the marked superiority of Reichhold's complete line of synthetic resins is the direct result of the continued work of this staff of experts.

Your inquiries concerning the use of Reichhold synthetic resins in the paper industry are welcomed.

**REICHHOLD CHEMICALS**
**INCORPORATED • DETROIT, MICHIGAN**

**WORLD'S LARGEST PRODUCERS OF SURFACE COATING SYNTHETICS**

# Construction News of Pulp and Paper Mills

## U. S. Paper Mills To Build One-Story Addition At DePere, Wis.—Peter J. Schweitzer, Inc., Elizabeth, N. J., Has Tentative Plans For Addition To Cost $500,000—Plan Modernization of Augusta Sulphite Pulp Mill.

**De Pere, Wis.**—The United States Paper Mills Corporation, Fort Howard avenue, has approved plans for new one-story addition, about 40 x 65 feet, for storage and distribution. Contract for erection has been let to Samuel D. Clark, 326 Marsh street, De Pere, and work will be placed under way at once. No estimate of cost announced.

**Elizabeth, N. J.**—Peter J. Schweitzer, Inc., 994 Newark avenue, manufacturer of cigarette, carbon, and other papers, has tentative plans under consideration for large addition to local mill, to be one-story, reported to cost in excess of $500,000, with equipment. Increased capacity will be carried out for different grades of paper.

**Louisville, Ky.**—The General Box Company, 816 South 16th street, manufacturer of corrugated boxes and containers, has awarded general contract to the Dahlem Construction Company, 1249 South Shelby street, for proposed new addition to plant, recently referred to in these columns, and work on superstructure is being placed under way. New structure will be two-story, 60 x 106 feet, and is reported to cost close to $50,000, with equipment, instead of smaller amount, previously noted. Sub-contracts are being let for heating, plumbing, etc., as well as an air-conditioning system in part of building. E. T. Hutchins, Heyburn Building, Louisville, is architect. Main offices of company are at 508 North Dearborn street, Chicago, Ill.

**Long Island City, New York**—See-Thru Container Corporation, organized to manufacture special paper boxes and containers, has leased a floor in building at Fortieth avenue and Twenty-first street, and will occupy for plant. It is proposed to begin operations at early date.

**Phillipsdale, R. I.**—Bird & Son, Inc., East Walpole, Mass., manufacturer of roofing and building papers, wall board, etc., has awarded general contract to the A. F. Smiley Construction Company, 308 Main street, Pawtucket, R. I., for new one-story addition to storage and distributing building at Phillisdale, 70 x 140 feet, recently noted in these columns, and will proceed with erection at once. Cost estimated close to $45,000 with equipment. Company also has work in progress on new addition on Washington street extension, East Walpole, to be used for storage and distribution expansion at mill, for which general erection contract recently was let to MacDonald & Belbin, Inc., 83 Broad street, Boston, Mass. Structure will cost approximately $50,000, with equipment.

**Augusta, Me.**—The Hudson Pulp and Paper Company, Maple street, has approved plans for modernizing and rebuilding a two-story structure at local mill, 100 x 130 feet, to be used for sulphite pulp production. Award for work has been made to the James Leck Company, 211 South Eleventh street, Minneapolis, Minn., and work will be placed under way at once. Cost is reported in excess of $60,000, with equipment. It is proposed to have the building ready for service early in 1940.

**Kansas City, Mo.**—Williams Roofing Products Company, Twelfth and Gentry streets, North Kansas City, roll roofing, roofing papers, etc., has plans maturing for new one-story building, 40 x 182 feet, to be used for storage and distribution. Cost reported close to $40,000, with equipment. Work will be placed under way soon.

**Appleton, Wis.**—The Appleton Coated Paper Company, 1200 North Meade street, has begun work for extensions and improvements in power house at mill, recently referred to in these columns, with addition for engine room service. The E. D. Chase Company, Oshkosh, Wis., has secured a sub-contract for roofing, etc. General contract will be carried out by the Koepke Construction Company, Appleton.

**Laurel, Miss.**—The Masonite Corporation, manufacturer of insulating board, pressed board, etc., has concluded arrangements for the purchase of the Celluform Corporation of New Jersey, 66th street and LaVergne avenue, Chicago, Ill., manufacturer of special insulation board under the patents of the Celluform Corporation of Delaware, which similarly has been acquired by the Masonite Corporation. The purchase includes all physical assets, as well as patents, trademarks, etc. It is understood that Chicago mill will be continued at present location, and company operated as a subsidiary interest.

**Chicago, Ill.**—The Eastman Kodak Company, Kodak Park, Rochester, N. Y., manufacturer of photographic and other processed papers, films, etc., has work under way on new three-story and basement branch plant, 100 x 175 feet, on Prairie avenue, near Seventeenth street, Chicago, previously referred to in these columns, and will equip for all main divisions of production. It is estimated to cost close to $500,000, with equipment, and is scheduled to be ready for service early in 1940. General erection is being carried out by J. W. Snyder & Company, 307 North Michigan avenue, Chicago. Schmidt, Garden & Erikson, 104 South Michigan avenue, Chicago, are architects.

**Kalamazoo, Mich.**—A survey of the pulp and paper mills in the Kalamazoo Valley district shows that practically every such plant in that area is now running full on a six-day week basis, with a number of mills engaging on an overtime production schedule.

**Middletown, Ohio**—The Inland Container Corporation, Nelbar street, manufacturer of corrugated paper boxes and containers, has awarded general contract to the Austin Company, 16112

Euclid avenue, Cleveland, Ohio, for proposed new addition to plant, recently referred to in these columns, and erection will be placed under way immediately. It will be one-story, 140 x 200 feet, estimated to cost in excess of $60,000, with equipment. Plans for the structure were drawn by the contractor noted.

**La Tuque, Que.**—The Brown Corporation, manufacturer of kraft fiber products, is running on a capacity schedule at its mill at La Tuque and proposes to continue on that basis for an indefinite period. During the fall of 1940, the company will secure additional power supply from the new hydro-electric generating plant now in course of construction at La Tuque, and in sufficient quantity to provide for future expansion at mill. The hydro-electric station will have a rated output of 162,000 horsepower, divided into four units of 40,500 horsepower each, and three of these machines are scheduled to be ready for service at the time noted. The plant is being built by the Shawinigan Water & Power Company, Montreal, Que.

**Mexico, D. F.**—The Ministry of Finance, Mexico, has plans maturing for the construction of a new mill for cellulose production, and a special Federal committee has been formed to carry out the project, headed by Eduardo Suarez, Minister of Finance. A site for the mill has been selected. It will consist of several production units, storage and distributing buildings, power house, machine shop and miscellaneous structures. Cost is estimated at 3,000,000 pesos (about $612,000), with equipment, one-half of which will be furnished by the Government and the remainder secured through the sale of stock. Plans for the new mill have been prepared by Fernando Galvan, managing director of Productura de Papel, S. A., Mexico City, who will supervise the erection and installation of equipment.

## New Line of Kennedy Valves

The Kennedy Valve Manufacturing Company announces a new line of bronze globe and angle valves with plug-type discs and renewable seat rings for close control in throttling service and for general heavy duty. These valves are made in sizes from ¼ inch to 2 inches for 200-lb. steam at 550 deg. F. and 400-lb. cold water, oil or gas, non-shock; and in sizes from ¼ inch to 3 inches for 300-lb. steam at 550 deg. F. and 600-lb. cold water, oil or gas, non-shock.

The plug type disc and renewable seat ring are both of copper-nickel alloy, the seat rings being made of a harder composition than the disc. The angularity and length of the disc and seat ring have been proportioned to minimize wear at small openings and to permit tight closure even if the faces are partially damaged in service; and each seat ring is matched to its companion disc to assure full bearing surface over the entire contact area of each.

The stems have 60,000-lb. per square inch tensile strength with acme standard threads, and have rounded stem head to permit self-centering of the disc. The bonnets are provided with particularly heavy union bonnet rings, and have machined seat on the under surface to permit repacking under full line pressure when the valve is wide open.

Circular 58 describing these valves in detail can be obtained by addressing The Kennedy Valve Manufacturing Company, Elmira, N. Y.

## PURCHASES CELLUFOAM PLANT

*(Continued from page 21)*

the municipal utility of Kaukauna, Wis. The city owns the mill property and is using part of it for a new hydro-electric plant.

Outagamie Mills, Inc., has capitalization of $100,000. It must spend at least $10,000 on improvements at the mill within 60 days, according to the contract, must agree to employment of a minimum number of persons, must pay $12 yer year rental for the property, and if the contract is fulfilled, Mr. Taylor will acquire the mill December 31, 1944 for $1.00, providing he agrees to operate it as a paper mill for five more years.

### Union Bag Transfers Machines To New York

Two paper machines at the Union Bag and Paper Company's former branch plant at Kaukauna, Wis., are being dismantled and will be shipped to Hudson Falls, N. Y. The plant has been leased under an agreement of five to ten years by the Thilmany Pulp and Paper Company to be used for expanding converting operations, warehousing and storage. Alterations and improvements are being made by a crew of 50 men working for C. R. Meyer Construction Company, Oshkosh, Wis.

### Sulphite Mills Receive Agreement

All of the sulphite mills in Wisconsin have received copies of an agreement sent out by a committee headed by Joseph M. Conway, president of Hoberg Paper Mills, Inc., Green Bay, Wis., covering a five-year program to complete research and develop a practical method of disposing of sulphite waste. All but three mills have subscribed to the plan as adopted at a recent meeting of mill owners. Mr. Conway says the Institute of Paper Chemistry, Appleton, Wis., will assign a specialist to this particular research work, with such other assistance as may be necessary. No present method except those involving impossible costs have been the solution of river pollution.

## Sale of Paper Machinery Sanctioned

HOOSICK FALLS, N. Y., December 4, 1939—Federal Judge Frank Cooper has sanctioned the sale of the machinery, equipment, supplies and accessories of the abandoned North Hoosick plant of the Stevens and Thompson Paper Company, the sale price being $17,500. The Miami Mills, Inc., of Florida, is the purchaser and it was announced that the material purchased will be taken to the South, probably Georgia, where a plant will be set up near to the market for the product to be manufactured. The local paper concern was represented by A. Kendall Roberts, appearing as counsel.

## To Aid Egyptian Paper Industry

WASHINGTON, D. C., December 6, 1939—It is reported that the Ministry of Finance has approached paper manufacturers and those who had previously contemplated the establishment of paper mills in Egypt and informed them that the government is prepared to give them such financial and moral support as will enable them to increase their production and establish a paper industry in Egypt on a firm basis, provided, of course, prices should not become excessive.

PAPER TRADE JOURNAL
Title Reg. U. S. Pat. Off.

Henry J. Berger
EDITOR

Ronald G. Macdonald
Editor Technical Section

Lynne M. Lamm
Washington Correspondent

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## COMING EVENTS IN PAPER INDUSTRY

NEW ENGLAND SECTION. Technical Association of the Pulp and Paper Industry—Third Friday of each month at the Roger Smith Hotel, Holyoke, Mass.

DELAWARE VALLEY SECTION. Technical Association of the Pulp and Paper Industry—Second Friday of each month at the Engineers Club, Philadelphia, Pa.

LAKE STATES SECTION. Technical Association of the Pulp and Paper Industry—Second Tuesday of each month at the Conway Hotel, Appleton, Wis.

KALAMAZOO VALLEY SECTION. Technical Association of the Pulp and Paper Industry—First Thursday of each month at the Park, American Hotel, Kalamazoo, Mich.

## BUSINESS PROSPECT GOOD

Although the general index of business activity which reached the highest point of the year on November 18 has declined a little at this date, the major factors appear to be favorable for the continuation of business at a level equal to if not above that of 1937. A favorable factor cited by some economists in the current state of industry and trade, is the large volume of durable goods production, such as household equipment, producers' equipment, building and construction, housing, industrial plants, and other goods having a life of three or more years. Non-durable or consumer goods, such as food, textiles, paper and paper products, are consumed over a shorter period of time and their production and distribution is, as a class, more uniform.

The national expenditure for durable goods in 1939 is estimated at $19350 millions, compared with $16460 millions in 1938, $19993 millions in 1937, and with $25532 millions in 1929, which was an all-time record. It is pointed out by economists that the volume of production of durable goods tends to be concentrated in periods of relative prosperity, since purchases are largely from savings and through installment credit, and thus depend on surplus earnings and low interest rates. Since the first of September the Federal Reserve Board's index of durable goods production has risen much as it did in September 1937 and above the non-durable goods index. The durable goods index for November 1939 is 127, and the non-durable goods index 118. Both indexes are on the 1923-1925 base, during which period business activity was at a high average level. Parity between the two indexes is thus commonly considered indicative of prosperous business conditions. In interpreting this relationship of the indices, economists point out that during the last 20 years the two have not remained close together for periods longer than one year and a half. When the indices meet it denotes peaks in the business cycle, such as in 1923, 1928-1929 and 1936-1937, following which important recessions in business activity occurred.

It should also be noted, that economists generally interpret a sharp rise of the durable goods index, above that of the non-durable goods index as likely to indicate the advance in business activity is over and a recession is about to begin. Advocates of this business cycle theory point to the middle of 1929 and the late summer of 1937 as examples.

All factors today point to an upswing in business and *The Guaranty Survey*, published by the Guaranty Trust Company, New York, states that "Evidences of business expansion are visible in almost all directions. The seasonally adjusted index of industrial production of the Board of Governors of the Federal Reserve System for October stands at 120 per cent of the 1923-1925 average, the highest level reported since 1929 with the single exception of December, 1936; and the board reports that activity increased further in the first half of November. Employment, according to the Secretary of Labor, has risen to a point where about 1,250,000 more workers are in non-agricultural private jobs than at this time last year. Railway freight traffic has begun its normal seasonal decline, but the recession thus far has been of considerably less than the usual magnitude. The National Association of Advisory Boards has announced a sharp upward revision in its estimates of car loadings for the final quarter of the year, placing the total 18.4 per cent above that for the corresponding period in 1938, as against an increase of 13.8 per cent in the original estimate.

"The general price level in recent weeks has shown no consistent trend. The wholesale price index of the Bureau of Labor Statistics for November 11 stands at 79.3 per cent of the 1926 average, showing no change for the week and a net advance of only .05 per cent for the four weeks ended on that date. A reflection of the expansion in industrial activity was seen in the announcement by the Social Security Board on November 23 that job placements by public employment offices in October exceeded all previous records and that unemployment benefit payments to insured workers during the same period were smaller than in any other months of this year. The number of persons seeking jobs through the public employment offices fell to the lowest level in twenty-two months.

In commenting on the business situation the United States Chamber of Commerce states that, "There are unmistakable indications that American business men are disposed to move cautiously in adjusting their operation to abnormal requirements and are more in-

tent upon the promotion of normal internal development. This has become necessary not only as a matter of furthering national economic and social progress but also as a matter of fortifying our internal economy against the disturbing effects of hostilities in Europe. For both reasons it is vitally important that the United States strengthen its economic defenses and build up its economic resources, and that it remove, as far as possible, obstacles which impede recovery and hamper constructive effort."

## To Direct Survey of Research

The appointment of Raymond Stevens, vice president of Arthur D. Little, Inc., of Cambridge, Mass., as director of a nation-wide survey of research in industry which is to be started at once, is announced by Dr. Ross G. Harrison, Chairman of the National Research Council. The announcement followed the first meeting of a special committee held at the Engineers' Club in New York to formulate initial plans.

In announcing Mr. Stevens' appointment, Dr. Harrison stated that while funds for the work had been made available by the National Resources Planning Board, of which Frederic A. Delano is Chairman, the survey would be conducted and the report prepared by the National Research Council, in accordance with plans approved by an Advisory Committee of leading scientists, industrial research directors and executives. Dr. Harrison said that the report will be submitted in printed form by the Council next year and would present an objective study of industrial research as a national resource, as a means of aiding in its further development and utilization.

Dr. Harrison stated that Mr. Stevens who is Vice President of Arthur D. Little, Inc., Chemists and Engineers of Cambridge, Massachusetts, has obtained a leave of absence that will permit him to devote a principal portion of his time to the survey, headquarters of which will be in the National Research Council Building in Washington.

## Simplified Practice for Paper Cups

WASHINGTON, D. C., December 4, 1939—Division of Simplified Practice, Bureau of Standards, has announced a general conference will be held on December 8 on the simplification of sizes, dimensions, and capacities of heavy-duty, round, nesting paper cups. In connection with this conference, W. E. Braithwaite of the Simplified Practice Division states:

"The Standards Committee of the Cup and Container Institute, Inc., submitted the enclosed proposal for simplification of this type of paper-cup, with the request that the Division of Simplified Practice call a meeting of all concerned to develop a simplified practice recommendation.

"In order that the meeting may properly consider the requirements of producers, distributors, and consumers in adopting simplified practice recommendations, it is most important that these three groups be adequately represented. The conference will also welcome the assistance and advice of all others directly or indirectly affected by the items under consideration."

## Production Ratio Report

These statistics are based upon paper production reports to the American Paper and Pulp Association.

COMPARATIVE MONTHLY SUMMARIES[1]

| Months | 1939 | 1938 | 1937 | 1936 | 1935 | 1934 |
|---|---|---|---|---|---|---|
| January | 77.5% | 63.9% | 90.3% | 76.1% | 65.8% | ..... |
| February | 81.7% | 68.7% | 90.1% | 77.9% | 70.0% | ..... |
| March | 84.0% | 69.6% | 90.3% | 76.0% | 70.5% | ..... |
| April | 82.9% | 68.3% | 92.1% | 82.3% | 70.0% | ..... |
| May | 80.2% | 69.0% | 90.6% | 81.6% | 69.4% | ..... |
| June | 79.7% | 66.0% | 87.3% | 80.7% | 72.3% | ..... |
| July | 75.2% | 72.0% | 81.8% | 77.3% | 64.9% | ..... |
| August | 82.9% | 77.2% | 82.9% | 81.5% | 70.9% | ..... |
| September | 88.7% | 76.3% | 78.6% | 80.5% | 71.9% | 58.2% |
| October | 96.6% | 82.5% | 73.5% | 87.6% | 75.6% | 64.7% |
| November | ..... | 79.6% | 61.9% | 88.0% | 75.3% | 61.7% |
| December | ..... | 74.4% | 54.5% | 85.9% | 71.2% | 59.6% |
| Year Average | ..... | 72.3% | 80.6% | 81.3% | 70.5% | ..... |
| First 47 weeks | 84.0% | 72.0% | 83.5% | 80.9% | 70.4% | ..... |

COMPARATIVE WEEKLY SUMMARIES[1]

| CURRENT WEEKS, 1939 | | CORRESPONDING WEEKS, 1938 | |
|---|---|---|---|
| October 21 | 98.5% | October 22 | 83.8% |
| October 28 | 97.8% | October 29 | 81.8% |
| November 4 | 98.0% | November 5 | 82.4% |
| November 11 | 98.1% | November 12 | 80.9% |
| November 18 | 98.3% | November 19 | 81.6% |
| November 25 | 95.2% | November 26 | 74.4% |

The following statistics show the number of mills reporting by ratio groups:

| | Number of Mills Reporting—Current Weeks | | | | | |
|---|---|---|---|---|---|---|
| Ratio Limits | Oct. 21, 1939 | Oct. 28, 1939 | Nov. 4, 1939 | Nov. 11, 1939 | Nov. 18, 1939 | Nov. 25, 1939 |
| 0% to 50% | 33 | 35 | 31 | 31 | 27 | 32 |
| 51% to 100% | 271 | 270 | 270 | 264 | 252 | 173 |
| Total Mills Reporting | 304 | 305 | 301 | 295 | 279 | 205 |

PAPERBOARD OPERATING RATIOS

Per cents of operation based on "Inch-Hours" reported to the National Paperboard Association.

| Year | Jan. | Feb. | Mar. | Apr. | May | June | July |
|---|---|---|---|---|---|---|---|
| 1935 | 62% | 68% | 68% | 63% | 61% | 66% | 62% |
| 1936 | 62% | 67% | 67% | 70% | 69% | 70% | 69% |
| 1937 | 80% | 86% | 86% | 88% | 85% | 77% | 66% |
| 1938 | 54% | 60% | 61% | 57% | 58% | 56% | 57% |
| 1939 | 60% | 67% | 71% | 69% | 64% | 67% | 63% |

| Year | Aug. | Sept. | Oct. | Nov. | Dec. | Year Avg. |
|---|---|---|---|---|---|---|
| 1935 | 67% | 71% | 77% | 71% | 61% | 66% |
| 1936 | 75% | 78% | 82% | 80% | 74% | 72% |
| 1937 | 74% | 69% | 65% | 55% | 45% | 73% |
| 1938 | 66% | 66% | 70% | 65% | 59% | 61% |
| 1939 | 72% | 74% | 84% | .... | .... | .... |

Week end. Oct. 21, 1939—84% Week end. Nov. 11, 1939—84%
Week end. Oct. 28, 1939—85% Week end. Nov. 18, 1939—83%
Week end. Nov. 4, 1939—84% Week end. Nov. 25, 1939—78%

[1] Production-capacity ratios are based upon six-day capacity ratings which are adjusted periodically to correspond with the ratings reported by individual companies. Ratios are subject to revision until all reports are received.

## Rapp Business To Continue

The business of the A. R. Rapp Company, built by A. R. Rapp who died recently, is to remain in the control of the Rapp family according to the statement that Mrs. Rapp is to operate the company with a daughter and a son to assist her. The business was built on Mr. Rapp's devices to increase the use of papers for household purpose and to perfect methods of imprinting wrapping papers with the advertising slogans of users.

## Swedish Pulp Cargoes Arrive at Albany

ALBANY, N. Y., December 4, 1939—Several Swedish vessels with pulp cargoes arrived here this week and are waiting for berth space to unload their shipments. The Swedish vessels, were the Virginia, Alida Gorthon, Belos, Sixten, Delaro and Vidar. The vessels carried cargoes amounting to several thousand tons and were passed through German control ports after long delays.

INTERESTING USES OF ALKALIES

# A Vital Step In The Manufacture Of Smokeless Powder

Smokeless nitrocellulose powder has largely replaced the black potassium nitrate powders for shotgun shells and rifle cartridges. In the preparation of nitrocellulose for this purpose, caustic soda plays a vital part. Before the cellulose can be converted into its nitro compound the fats and oils from the raw cotton are removed by the use of caustic soda in the ratio of about 2% to the weight of the raw cotton.

Because the function of alkalies in manufacturing industries is seldom recognized in the finished product, the average layman has little conception of the tremendous tonnage of caustic soda, soda ash, liquid chlorine and bicarbonate of soda used in manufacturing such important commodities as chemicals, paper, soap, textiles, glass, foods and drugs. Neither does he realize how numerous and how varied are the uses made of these alkalies. Some of the more or less obscure and minor uses have been depicted in this series of advertisements here concluded.

We have taken this novel way of bringing the name COLUMBIA to the attention of executives, technicians and purchasing heads with the hope that the high quality of COLUMBIA products and the dependability of COLUMBIA service will be remembered through the year and years that lie ahead.

*We shall be glad to send you free of charge a large size reproduction of above illustration, "The Skeet Shooter" suitable for framing, if requested on business letterhead and naming magazine in which you saw this advertisement.*

# COLUMBIA

SODA ASH • CAUSTIC SODA • SODIUM BICARBONATE • • •
MODIFIED SODAS • LIQUID CHLORINE • CALCIUM CHLORIDE

THE COLUMBIA ALKALI CORPORATION
EXECUTIVE SALES OFFICES: 30 ROCKEFELLER PLAZA, NEW YORK, N. Y.
Plant: Barberton, Ohio
CHICAGO . BOSTON . ST. LOUIS . PITTSBURGH . CINCINNATI . CLEVELAND . MINNEAPOLIS . PHILADELPHIA

Section of the
Technical Association of the Pulp and Paper Industry

Edited by Ronald G. Macdonald. Secretary

# Arrangement of the Cellulose Crystallites In Ray Cells of White Oak As Determined by X-Rays*

By S. T. Gross[1], G. L. Clark[1], and G. J. Ritter[2]

**Abstract**

*By means of thin sections of white oak ray cells, a specimen was built that enabled the determination of the arrangement of the cellulose crystallites by x-rays. The cellulose crystallites were found to deviate about 30 deg. from the vertical crosswise direction in the ray cells of white oak, which arrangement is in general agreement with that found by microscopical means. This finding indicates that the ray cells of white oak will shrink and swell considerably in their longitudinal and tangential directions, which is, also, in general agreement with the findings obtained by microscopical means.*

Though x-ray data on the crystal arrangement in wood fibers are recorded in the literature, no such data have been published on the determination, by x-ray methods, of the arrangement of the cellulose crystallites in the ray cells of wood. Undoubtedly, the absence of published results on the subject is due to the difficulty of preparing ray-cell specimens suitable for making the determination.

The location of the ray cells in wood is shown in the highly magnified sketch of a hardwood block, Fig. 1. They are labeled *rc* and, as may be noted, are the structural units of the wood rays labeled *wr*. Lettered arrows pointing in the radial, tangential, and longitudinal directions of the wood are shown at the margin of the figure, from which it is apparent that the ray cells are arranged in the radial direction of the wood.

* Presented at the meeting of the American Chemical Society, Baltimore, Maryland, April 3-7, 1939.

[1] University of Illinois, Urbana, Ill.

[2] Forest Products Laboratory, Forest Service, U. S. Dept. of Agriculture, maintained in cooperation with the University of Wisconsin, Madison, Wis.

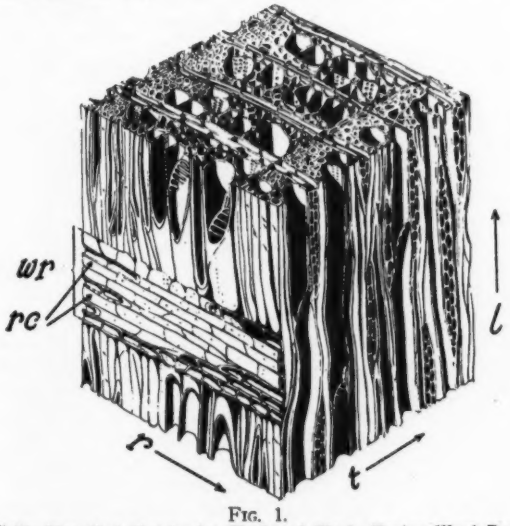


FIG. 1.
Highly Magnified Sketch of a Hardwood Block, Having Wood Rays, *wr*; Ray Cells, *rc*. Marginal Arrows Indicate Radial, Longitudinal, and Tangential Directions of the Wood.

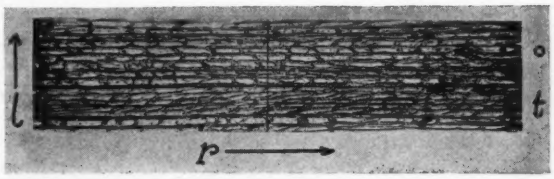


FIG. 2.
Microtome Section of White-Oak Ray Cells. Lettered Arrows Indicate Longitudinal, Radial, and Tangential Directions of the Wood.

## Material and Procedure

One of the authors of the present paper developed a microtome method for isolating, from white oak wood, thin sections of ray cells, free of fibers. The sections were delignified by the procedure of Van Beckum and Ritter for the isolation of holocellulose *(1)*, thus making available a material well adapted for the preparation of ray-cell specimens suitable for x-ray orientation studies.

Fig. 2 shows a photomicrograph of a thin delignified ray-cell section, such as just described. The lettered arrows indicate the directions corresponding to those in Fig. 1.

A ray-cell specimen large enough for producing suitable x-ray diffraction patterns was prepared by assembling the delignified ray-cell sections in the form of a block, having its ray cells as nearly parallel as possible, and then cementing the sections together with a dilute solution of collodion in alcohol. The block was shaped, by means of a razor blade, into

a cubical specimen. X-ray patterns were made with radiation from a copper-target x-ray tube, filtered through nickel foil, and reflected by the specimen to a photographic film at a distance of 3 centimeters.

### Results and Discussion

Previously, it was assumed *(2 3, 4)* that the cellulose crystallites in ray cells are arranged parallel with the direction *r* in Fig. 2, that is, radially in the tree. If that assumption were right, diffraction patterns taken with the x-ray beam parallel with the direction *r* would show no orientation maxima, but instead rings as indicated by the diagram of Fig. 3, *r*. And patterns taken with the x-ray beam parallel with the directions *l* and *t*, respectively, would show orientation maxima represented by the diagrams of Fig. 3, *l*, *t*.

The diffraction patterns actually produced by the white oak ray-cell specimen are shown in Fig. 4, *r*, *l*, and *t*, together with their respective diagrams. Fig. 4, *r*, was taken with the x-ray beam passing in direction *r;* it shows orientation maxima arcs crossing the equator. The location of the intensity maxima indicates that the cellulose crystallites must be arranged, approximately, in direction *l*. Fig. *4, l*, was taken with the x-ray beam passing in direction *l;* it shows diffraction rings with no orientation maxima, which, also, indicates that the cellulose crystallites are arranged with their long axes, approximately, in the *l* direction. Fig. 4, *t*, was taken with the x-ray beam passing in direction *t;* it shows orientation maxima of the cellulose crystallites crossing at about 60 deg., showing orientation maxima about 30 deg. above and below the equator. This pattern indicates that the cellulose crystallites deviate 30 deg. from the *l* direction, which is the vertical crosswise direction of the ray cells in Fig. 2. The deviation may be due to the arrangement of the cellulose crystallites in a helical fibrillar structure similar to that known to exist in the wood fibers. (See note.)

Although the cellulose crystallites deviate approximately 30 deg. from the *l* direction of the ray cells, their arrangements disproves the previous assumption that they are arranged in direction r *(2, 3, 4)*. These results are in general agreement with the microsopical results of Ritter and Mitchell *(5)* who determined the crystal arrangement in the ray cells indirectly by finding the orientation of the slow and the fast vibration planes of light in the cellulose crystallites.

The crystal arrangement recorded in the present paper indicates that the ray cells will shrink and swell primarily in the directions *r* and *t*, which in the ray cells are the longitudinal and tangential directions. These results further confirm those obtained microscopically by Ritter and Mitchell *(5)*.

The x-ray patterns indicate that the structure of the ray cells is more complicated than was first anticipated. A quantitative interpretation of these patterns is rendered difficult on account of the diffuseness of the interferences. It is possible that large percentages of hemicelluloses in the ray cells may tend to mask the diffracting effect of the regularly oriented cellulose crystallites, and thus account for the lack of sharp orientation maxima.

This phase of the subject is being left open until specimens can be prepared that will produce sharper x-ray diffraction patterns than were obtained in the present study.

Note: The line diagrams here are included to indicate more clearly the observable intensity maxima on the patterns. Since the two inner interferences in Fig. 3 are not resolved in the diffraction patterns of Fig. 4, they have been grouped together, also, in the respective line diagrams.

FIG. 3.

**Drawings of the X-Ray Diffraction Patterns; *r*, When Beam Passes Parallel to the Long Axis of the Cellulose Crystallite; *l* and *t*, When Beam Passes Perpendicular to the Long Axis of the Cellulose Crystallite.**

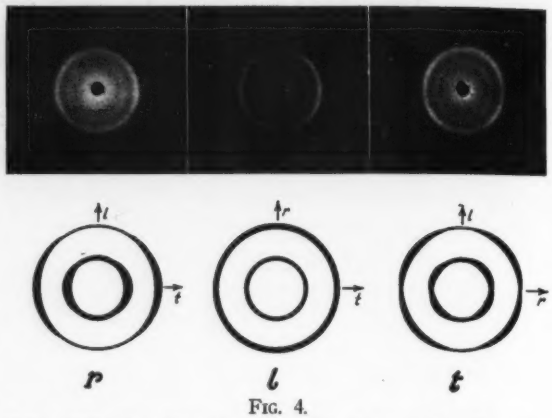


FIG. 4.

**X-Ray Diffraction Patterns, With Their Corresponding Drawings, Which Are Produced by White-Oak Ray-Cell Specimens Under Three Different Arrangements; *r*, When Beam Passes in the Radial Direction of the Wood; *l*, in the Longitudinal Direction; and *t*, in the Tangential Direction.**

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## Buy Paper Under Walsh-Healey Act

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., December 6, 1939—During the week ended November 18, the government purchased $113,357.68 worth of paper and allied products under the Walsh-Healey Act as follows: $12,800.00 worth of templet paper for the Navy Department from The West Jersey Paper Manufacturing Company, Camden, N. J.; $26,667.32 worth of masking tape for the War Air Corps, from the Minnesota Mining and Manufacturing Company, St. Paul, Minn.; $23,471.17 worth of ledger paper for the Government Printing Office from Stanford Paper Company, Washington, D. C.; $12,723.84 (estimated) worth of label paper for the Post Office from Marquette Paper Company, Chicago, Ill.; $11,099.35 worth of fiber boxes for the War Air Corps from the Combined Locks Paper Company, Combined Locks, Wis.; and $26,696.00 worth of fiber containers for the War Ordnance from Kraft Corrugated Containers Inc., South Kearney, N. J.

# The Lime–Chlorine System in the Preparation of Calcium Hypochlorite*

By F. W. O'Neil[1] and J. D. Rue[2]


## Abstract

*Potentiometric studies have been made during progressive chlorinations of solutions containing 16 g. per liter, 32 g. per liter, and 52 g. per liter of calcium hydroxide at temperatures of 0 to 40 deg. C. As a result of these studies the authors have found that: During the chlorination the hydrogen ion concentration decreased rather slowly at first with a very rapid increase in available chlorine content; further chlorination beyond a hydrogen ion concentration of 11.2 caused a very rapid decrease in pH and only a slight increase in available chlorine; when the lime is chlorinated below a pH of 8, the loss of available chlorine is very rapid, and at temperatures above 10 deg. C., the loss is greater than that which can be maintained by the addition of chlorine, and on standing the solution loses practically all of its available chlorine; lime chlorinated to the "three second flash" of phenolphthalein, which corresponds to a pH of 11.2, produces bleach liquor which is stable for at least 48 hr.*


The art of chlorine bleaching was made possible through the efforts of Scheele, the Swedish chemist who discovered chlorine, and Tennant, who found that chlorine would rapidly combine with slaked lime and form a very good bleaching compound. Later, through the efforts of Tennant, the art was further advanced by the preparation of dry chloride of lime.

Metallurgical research has further advanced the use of chlorine by the development of chlorine resisting metals which enable the consumers to prepare calcium hypochlorite and chlorine water, and to use gaseous chlorine at their own plants.

## Chemical Consideration

When chlorine is dissolved in water with no appreciable amounts of alkaline constituents present, the following reactions take place:

$$\begin{aligned} Cl_2 + H_2O &\leftrightarrows HCl + HOCl \\ HCl &\leftrightarrows H^+ + Cl^- \\ HOCl &\leftrightarrows H^+ + (OCl)^- \end{aligned}$$

The dissociation constants for the above reactions are given as follows, *(1, 2)*:

$$\frac{(H^+)\ (Cl^-)\ (HOCl)}{Cl_2} = 4.48 \times 10^{-4}$$

and

$$\frac{(H^+)\ (OCl^-)}{HOCl} = 3.7 \times 10^{-8}$$

Increasing the $H^+$ concentration by the addition of a strong acid causes the reaction to proceed as follows:

$$2HOCl + 2H^+ \leftrightarrows H_2O + Cl_2 \qquad (1)$$

Likewise, increasing the $(OH)^-$ concentration by the addition of NaOH or $Ca(OH)_2$ causes the action to be reversed and proceed to the formation of $(OCl)^-$ as follows:

$$HOCl + (OH)^- \leftrightarrows H_2O + (OCl)^- \qquad (2)$$

by increasing the $(OH)^-$, as with the addition of $Ca(OH)_2$ or NaOH, more $(OCl)^-$ is formed, and this reacts with the positive ion of our base to form hypochlorite.

According to Hochberger and Opfermann *(3)*, from which the data in the following table are taken, HOCl is present in appreciable quantities in a solution containing chlorine between the ranges of *p*H of 2 and *p*H of 9.

TABLE I
RELATIVE COMPOSITION OF A SOLUTION OF $Cl_2$ AT VARIOUS pH AT 25 DEG. C.

| pH | Ratio of HOCl to OCl | | Ratio of $Cl_2$ to HOCl |
|---|---|---|---|
| | Sand | Soper | Jakowkin |
| 1 | $2.3 \times 10^6$ | $10^7$ | 30 |
| 2 | $2.3 \times 10^5$ | $10^6$ | 1 |
| 3 | $2.3 \times 10^4$ | $10^5$ | 1/13 |
| 4 | $2.3 \times 10^3$ | $10^4$ | 1/130 |
| 5 | $2.3 \times 10^2$ | $10^3$ | 1/1330 |
| 6 | 23.0 | $10^2$ | |
| 7 | 2.3 | 10 | |
| 8 | 1/4 | 1 | |
| 9 | 1/44 | $10^{-1}$ | |
| 10 | 1/440 | $10^{-2}$ | |
| 11 | 1/4440 | $10^{-3}$ | |
| 12 | $1/4.4 \times 10^4$ | $10^{-4}$ | |
| 13 | $1/4.4 \times 10^5$ | $10^{-5}$ | |

In the light of these chemical considerations it is interesting to examine what takes place progressively when chlorine is added to a lime suspension as in the making of "commercial" bleach liquor, and also when the addition is carried in excess of that commonly recognized as sufficient to insure a relatively stable solution. A series of *p*H determinations were made during the chlorination of milk of lime suspensions at various temperatures and concentrations of total and available chlorine.

The solution was prepared by mixing a predetermined amount of hydrated lime in a known amount of water and then bubbling chlorine gas into the mixture. A sample of the solution was taken at the start and then at definite intervals during the chlorination of the milk of lime. These samples were tested for *p*H, using the Coleman *p*H electrometer with a glass electrode, standardized with potassium acid phthalate at *p*H of 3.97 and sodium hydroxide—sodium chloride glycocal at *p*H of 11.5; and for total and available chlorine by standard methods. A potentiometric titration was also made on a solution of calcium hypochlorite using HCl.

The lime used for the bleach liquor preparation had the following analysis:

| | |
|---|---|
| $CO_2$ | 1.41 |
| $H_2O$ | 23.47 |
| CaO | 72.90 |
| $SiO_2$ | 1.09 |
| $R_2O_3$ | 0.58 |
| MgO | 0.66 |
| | 100.11 |

Results showed that as the chlorination proceeded the change in *p*H was only 1.0 to 1.2 *p*H *units* until



* Presented at the Fall Meeting of the Technical Association of the Pulp and Paper Industry, Hotel Syracuse, Syracuse, New York, September 12-14, 1939.

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[2] Member TAPPI, Engineer, Hooker Electrochemical Company, Niagara Falls, New York.

the normal end-point, as determined in commercial practice, was reached, regardless of the temperature or concentration, within the limits studied. The end-point was indicated by a three second flash of phenolphthalein and was equivalent to 11.2 *p*H. Further chlorination produced a decided drop in *p*H with almost negligible increase in available chlorine concentration. Below 8.5 *p*H the loss of available chlorine became noticeable. (Fig. 1 and 2.)

The further the *p*H falls below 11.2 the greater is the loss in available chlorine on standing. A solution containing 32 g. per liter $Ca(OH)_2$ and approximately 30 g. per liter of available chlorine will, at *p*H of 5, lose practically all of its available chlorine on standing for 24 hr. at room temperature. (Fig. 2, curve B.)

It is possible to restabilize a solution that has passed the desired *p*H by the addition, within a few minutes of the time the end-point was passed, of sufficient hydrated lime to bring the *p*H above 11.2. This solution will then remain stable at least over a period of

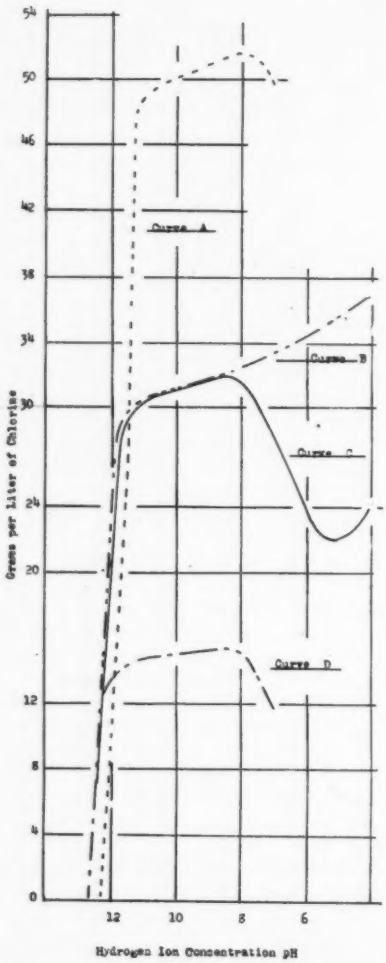


FIG. 1.

Progressive chlorinations of $Ca(OH)_2$ solutions. CURVE A, 16 g. per liter $Ca(OH)_2$ solutions showing the available chlorine concentrations. CURVE B, 32 g. per liter $Ca(OH)_2$ solutions showing total chlorine concentrations. CURVE C, 32 g. per liter $Ca(OH)_2$ solutions showing available chlorine concentrations. CURVE D, 52 g. per liter $Ca(OH)_2$ solutions showing available chlorine concentrations. Note—Temperature 30 deg. C. at pH 11.2 in all the above determinations.

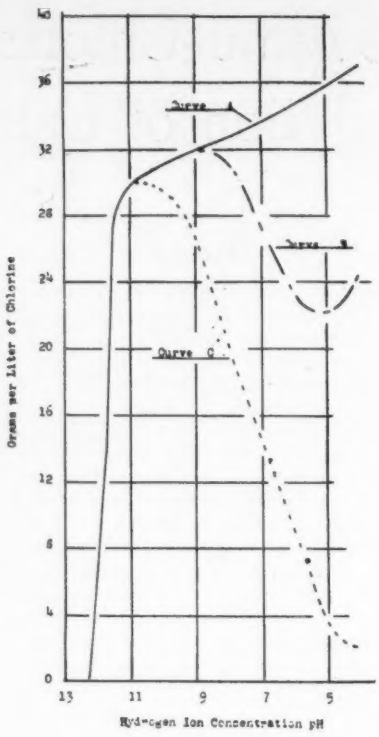


FIG. 2.

32 g. per liter $Ca(OH)_2$ solutions progressively chlorinated at 20 deg. C., 30 deg. C. and 40 deg. C. CURVE A, Total chlorine concentrations. CURVE B, Available chlorine concentrations. CURVE C, Effect of standing 24 hours at the above temperature on the available chlorine concentrations. Note—Curves are the average of the values obtained at 20 deg. C., 30 deg. C. and 40 deg. C. These values did not deviate more than 0.2 pH unit from the curve.

48 hours. Table II shows that less than 3 per cent of the total available chlorine is lost from a 60 g. per liter solution on standing 48 hr. at 30 deg. C. and that below 42 g. per liter the solution does not lose an appreciable amount.

TABLE II.—LOSS OF CHLORINE FROM CALCIUM HYPOCHLORITE SOLUTIONS ON STANDING 48 HR. AT 20 DEG. C.

| Concentration grams per liter | Percentage of original solution remaining on standing 48 hr. (pH 11.2) |
|---|---|
| 30.0 | 100 |
| 36.0 | 100 |
| 42.0 | 100 |
| 48.0 | 97.6 |
| 54.0 | 97.4 |
| 60.0 | 97.2 |

There is a remarkable resemblance in the direction of these curves to those drawn from figures obtained by potentiometric titration of $Ca(OCl)_2$. Curves D, C, and A of Fig. 1 show the effect of adding chlorine to three suspensions containing 16 g. per liter, 32 g. per liter, and 52 g. per liter of $Ca(OH)_2$, respectively, which is equivalent to approximately 15, 30, and 50 g. per liter of $Ca(OCl)_2$, respectively, at *p*H of 11.2, or the three second flash of phenolphthalein. Upon addition of chlorine to the milk of lime there is a slight change in the *p*H of the original solution, (*p*H of 12.4-12.6), with considerable increase in available $Cl_2$ until *p*H of 11.2 is reached. This slight decrease in *p*H is exhibited by the curve of Fig. 4 showing the effect of titrating 30 g. per liter $Ca(OCl)_2$ with N/1 HCl. In this solution there is

still an excess of $(OH)^-$ which tends to suppress the HOCl formation in favor of the $(OCl)^-$ formation as shown by equation (2). Now, however, with only a slight increase in the available chlorine content, the *p*H of the solution drops very rapidly to a *p*H between 8 and 9. During this addition of chlorine the $(OH)^-$ while not completely disappearing is largely suppressed, and the equation:

$$HOCl + (OH)^- \leftrightarrows H_2O + (OCl)^- \qquad (2)$$

has shifted more to the left for at this *p*H we do not have the excess of $(OH)^-$ to react with the $(OCl)^-$ and it therefore follows equation (1), and the chlorine reacts with the water to form the HOCl. There is also a change in the direction of the potentiometric curve of Fig. 4 at this point. This change in direction indicates the formation of a new substance in the solution which we have stated to be HOCl. This is further substantiated by reference to Table I. The ratio of HOCl to $(OCl)^-$ has increased 40-50 times during the change in *p*H to from 12.6 to 8-9.

### Effect of Temperature on Stability

At this point, when the solution is prepared between 0 and 5 deg. C. we notice from Fig. 3, curve B, that the available chlorine values follow very closely those of the total chlorine. The difference between these values being due to auto-oxidation with the formation of chlorates, or the liberation of oxygen. This curve also follows the general trend of the potentiometric curve of Fig. 4, with changes in direction occurring at essentially the same place.

However, when the solution is prepared at higher temperatures, 20-40 deg. C., an entirely different picture presents itself as shown by Figs. 1 and 2. At *p*H of 8 the values of the total chlorine concentration continue to follow the general trend of the potentiometric curve of Fig. 4. The values of the chlorine concentration and *p*H progressively decrease. Up to this point, as previously stated, the values of the available chlorine have closely followed the values of the total chlorine concentration. Below *p*H of 8 the value of the available chlorine concentration decreases very rapidly with slight decreases in *p*H, regardless of the amount of chlorine added, until *p*H of 5 is reached. A slight increase in the value of the available chlorine occurs between this *p*H and *p*H of 3.8.

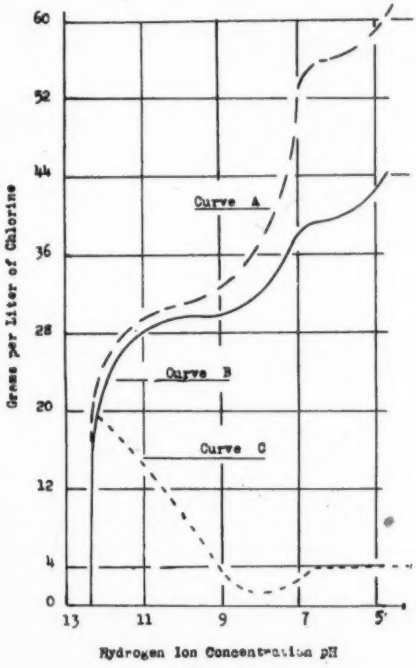


FIG. 3.

Progressive chlorination of 32 g. per liter $Ca(OH)_2$ solution at 0 deg. C. to 5 deg. C. CURVE A, Total chlorine concentrations. CURVE B, Available chlorine concentrations. CURVE C, Effect of standing 24 hours at the above temperature on the available chlorine concentrations.

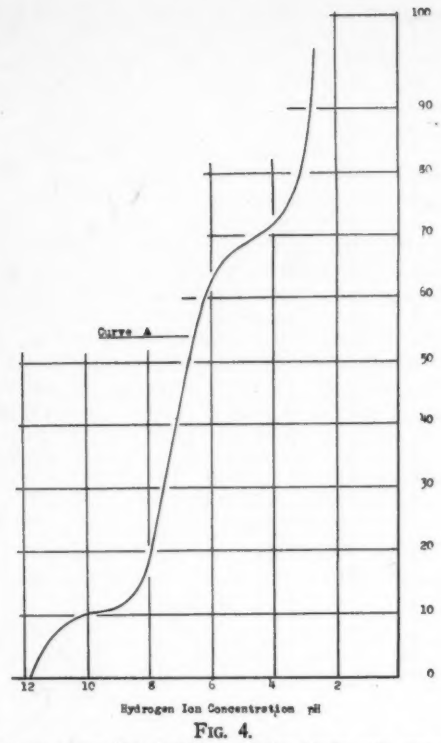


FIG. 4.

CURVE A, 30 g. per liter $Ca(OCl)_2$ solution titrate with normal HCl at 20 deg. C.

### Relation of Availability of Chlorine to pH

The dissociation constant of HOCl shows that it is a very weak acid. Its value is about $3.7 \times 10^{-8}$, whereas the dissociation constant of the weak acid, acetic acid is $1.9 \times 10^{-5}$. This is one of the principal factors influencing complex ion formation. Another important fact is that complex ions may form a meta-stable state within certain *p*H ranges. Furthermore, the formation of this complex would not affect the potentiometric curve of Fig. 4.

Listed below are two of the possible methods of formation of what is assumed to be this meta-stable complex compound:

$$Ca(OCl)_2 + 2HOCl \leftrightarrows H_2[Ca(OCl)_4] \qquad (3)$$

$$CaCl_2 + 2\,HOCl + 2H_2O \leftrightarrows H_2[Ca(OCl)_4] + 2H^+ \qquad (4)$$

$$H^+ + Cl^- \leftrightarrows HCl \qquad (5)$$

Either of these methods are acceptable, for all the constituents necessary for its formation are present in the solution. At *p*H of 9 there is still an excess of $(OCl)^-$ present, but on further addition of chlorine we begin to have HOCl present. The decrease in *p*H may be accounted for by the formation of HCl along with the formation of HOCl or from the combination of the $H^+$ from the reaction and the $Cl^-$ being added

to the solution as shown in equation (5). This increase in the acidic condition of the solution will continue throughout the rest of the chlorination for $Cl_2$ will be added and the formation of HCl will be continuous. However, the formation of the meta-stable complex does not continue indefinitely. Between the *p*H of 9 and 5 the available chlorine is being progressively removed from the solution by the formation of the complex calcium tetra chlorous acid ($H_2Ca(OCl)_4$). This complex-bound-chlorine is not available and therefore not titratable as available chlorine. However, in the analysis of total chlorine, the strong nitric acid added to the solution decomposes this complex and the chlorine is precipitated as the insoluble chloride of silver. When *p*H of 5 is reached, the total chlorine continues to increase in an orderly manner but the available chlorine increases much more rapidly, as shown by Fig. 1, curve C, and Fig. 2, curve B. It is believed that at *p*H of 5 the lower critical limit for the formation of the complexion has been reached and lowering the *p*H causes a gradual decomposition of this complex. As stated before this causes a rapid releasing of the chlorine held in the complex and some becomes available to the solution, and thus titratable while the rest is evolved as HOCl.

Also at *p*H of 5 a new component enters into the system, namely $Cl_2$. This is shown by the change in the direction of the curve of Fig. 4 as well as from the calculations of Jakowkin shown in Table I. From *p*H of 5 to *p*H of 1 the concentration of the elemental chlorine increases $10^4$ times with respect to the HOCl concentration. For all practical purposes, at *p*H below 2 elemental chlorine is the essential active component.

A study has been made on a solution of lime, chlorinated in the usual manner, but carried to excess in that the *p*H of the solution at the end of the chlorination period was 7.6. This solution was allowed to stand for a period of nine days at 20 deg. C., checking the *p*H and available chlorine concentration over the period with the following results:

TABLE III

| Time (Hours) | pH | Available chlorine grams per liter |
|---|---|---|
| 0 | 7.6 | 31.2 |
| 24 | 6.9 | 7.75 |
| 48 | 6.5 | 4.4 |
| 72 | 6.5 | 3.9 |
| 96 | 6.5 | 3.1 |
| 216 | 6.5 | 1.2 |

At *p*H of 7.6 we have a slight amount of $(OH)^-$, some $(OCl)^-$ and some HOCl present in the solution. This is obviously an unstable solution, but on the loss of the $(OH)^-$, probably in the further formation of $(OCl)^-$, the *p*H is decreased progressively to 6.5, at which point a stable solution exists containing $(OCl)^-$ and HOCl. The decrease in chlorine concentration substantiates the formation of a complex which removes the chlorine from the solution as shown by equation (3) or (4), and forms the complex calcium tetra chlorous acid. However, in this case the free chloride is absent and therefore hydrochloric acid does not form, and consequently the *p*H is not lowered below that of the complex.

### Practical Applications

From this discussion it appears that there are three points which are of extreme importance to the papermaker:

The bleach liquor must be kept at a *p*H greater than 11.2 for complete stability.

The bleach liquor which has been allowed to drop to a *p*H lower than this may be restabilized by the prompt addition of hydrated lime.

The bleach liquor system is an exceedingly complex system, and in order to maintain consistent results in the bleach plant, the bleach liquor preparation methods as well as the bleaching conditions must be kept constant.

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# Effect of Filler Brightness on Lined Board Brightness*

By W. R. Willets[1,2], R. T. Bingham[1,2], and L. H. Eriksen[2]

### Abstract

*The brightness of a lined board is experimentally shown to be dependent on the opacity and brightness of the liner, and on the brightness of the underlying filler. If the opacity and brightness of the liner are constant, the brightness of the filler determines the brightness of the board. If the brightness of the filler is constant, the opacity and brightness of the liner determine the brightness of the board. It is indicated that it is probably more feasible to increase board brightness by increasing the opacity and brightness of the liner than by increasing the brightness of the filler. It is possible to cover a filler of low brightness and secure good ultimate board brightness, even with light weight liners, if the liner is pigmented with titanium dioxide.*

In a previous paper (*1*) it was shown that the brightness of a lined board having a filler (middle) of constant color and brightness is dependent on the opacity and the brightness of the liner sheet. It was also noted that the brightness and the color of the filler to which the liner is applied would probably affect the ultimate brightness and color of the lined board, as it is more difficult to "cover" a filler of low brightness than one of higher brightness.

While such a statement appears logical, a review of the literature has not indicated any data actually confirming it. In the article referred to above, lined board brightness was varied by varying liner sheet opacity and brightness, but in all cases the filler brightness was maintained constant. The present re-

* Presented at the Fall Meeting of the Technical Association of the Pulp and Paper Industry, Hotel Syracuse, Syracuse, New York, September 12-14, 1939.

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port, therefore, deals with the effect of filler brightness on ultimate board brightness, under varying conditions of liner sheet opacity and brightness.

The data contained herein are confined to single ply top liners, although it is recognized that many products are made with sub-liners. However, the indications noted would probably hold true regardless of whether or not a sub-liner was used, since varying the brightness of the filler will simulate the effect of obtaining various brightness using sub-liners.

## Procedure

The general procedure followed for this work has already been given *(1)* and so will not be repeated herein.

The liner stock consisted of purified bleached sulphite, lightly beaten, which was prepared in batch lots for each run. This was done to produce sheets in each set which would be as nearly identical as possible, so that the only variable would be the brightness of the middle.

The filler stock consisted of varying proportions of old newsprint and bleached chemical pulp. By regulating the proportions it was possible to vary and control the brightness of the filler.

Three runs were made using liners of different weights (about 78, 56 and 38 pounds, 25x38-500). Each liner weight was made unpigmented, and pigmented with 1, 2, 3 and 4 per cent titanium dioxide (Titanox-A). Lined boards were made, combining the various filler and liner variations.

The liner sheets were tested for opacity and brightness, using a Bausch and Lomb Opacity Meter, while the boards were tested for brightness, using the same instrument. The basis weight, ash and titanium dioxide content of the liner sheets were also determined.

## Results

Details of the test data are given in the appendices. It will be noted that for each weight of liner there were four variations of filler brightness, and that for each variation of the filler brightness there were five variations of pigmentation. The variation in basis weight within any one run was very slight. Inasmuch as the same liner stock was used throughout any one run, there were no variations resulting from differences in beating, etc.

While the results are probably not absolute, nevertheless they were obtained under identical conditions and so should be relative and comparable.

## Effect of Filler Brightness on Board Brightness

Fig. 1 indicates that as the brightness of the filler increases for any given liner condition, the brightness of the board increases. This is more pronounced if the liner sheet opacity and brightness are in the lower ranges resulting in lower ranges of board brightness.

For example, in curve 1 of Run 3, where the board brightnesses were in the lower ranges, an increase in the filler brightness from 38.3 to 77.9 per cent resulted in an increase of board brightness of about 14 points, from 64.1 to 78.2 per cent. In curve 5 of Run 1, where the board brightness was in the higher ranges, a corresponding increase in the filler brightness resulted in an increase in the board brightness of about 1.5 points, from 80.8 to 82.3 per cent. Other

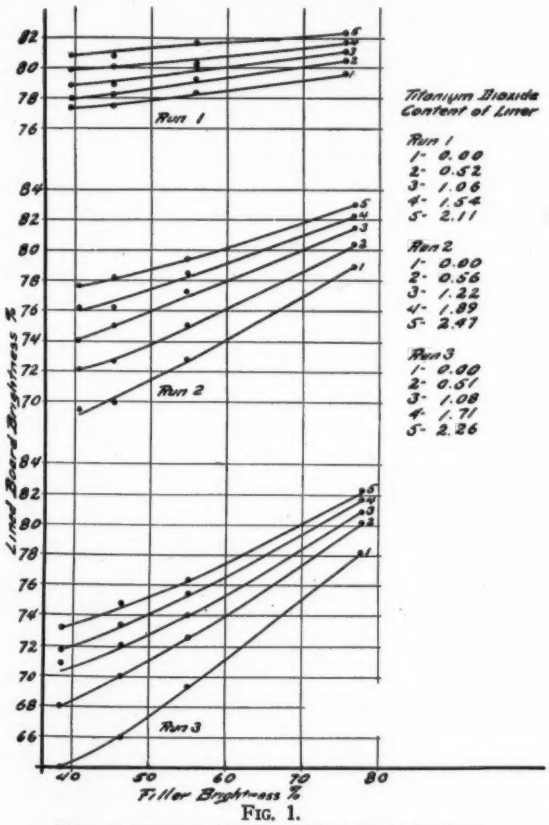


FIG. 1.

**Effect of Filler Brightness on Lined Board Brightness**

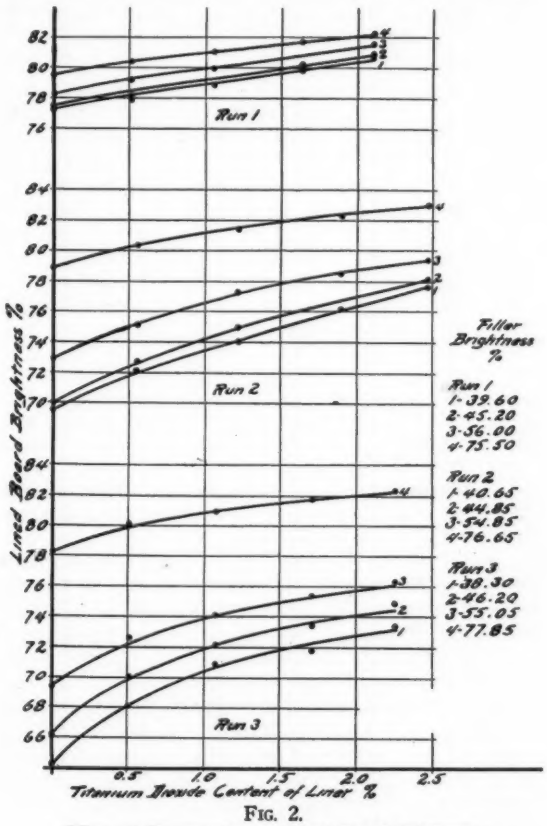


FIG. 2.

**Effect of Pigmentation on Lined Board Brightness.**

similar deductions can be made from an examination of the data.

The effect of the filler brightness on ultimate board brightness may be a very important factor in some cases where a mill is using a widely varying old paper furnish for its filler stock. It has been noted that even in boards which had the same liner furnish, thickness, etc., there was a distinct difference in appearance because of the difference in the brightness of the filler underlying the liner. For this reason, it might frequently be advisable for a mill to exercise a little closer control of the old paper stock being used for the filler.

Of course, there are several ways in which a filler of higher brightness could be made, such as partially deinking and washing the old paper stock, or by the addition of lighter grades of old paper stock or virgin pulp. While it would probably be impractical in many cases to raise the filler brightness by the use of bleached pulp, etc., possibly something could be accomplished by paper sorting.

### Effect of Pigmentation

Fig. 2 shows the effect of using titanium dioxide in the liner on the ultimate board brightness at various filler brightnesses. It is clearly indicated that pigmentation makes it much easier to cover a dull filler than if an unpigmented liner sheet is used. For example, using a light weight liner, about 0.8 per cent titanium dioxide in the liner sheet gave as good board brightness on a filler having a brightness of 38.3 per cent, as did an unpigmented sheet on a filler having a brightness of 55.1 per cent (Run 3).

When a much heavier liner was used (Run 1), a liner sheet containing about 1.6 per cent titanium dioxide, on a filler of 39.6 per cent brightness, gave as good board brightness as an unpigmented liner on a filler of 75.5 per cent brightness. Similar deductions can be made from a further study of the data given.

A consideration of the data on the effect of filler brightness, and of liner opacity and brightness, on the ultimate brightness of lined boards, indicates that probably more can be accomplished by increasing the liner opacity and brightness than by increasing the filler brightness.

Naturally, the use of sub-liners of better brightness and color than the underlying filler plies will aid the brightness of the final lined board.

### Conclusions

The brightness of a lined board is dependent on the opacity and the brightness of the liner, and the brightness of the underlying filler.

If the brightness and the opacity of the liner are constant, an increase in the brightness of the filler will increase the brightness of the board.

If the brightness of the filler is constant, an increase in the opacity and the brightness of the liner will increase the brightness of the board.

If the opacity and the brightness of the liner are low, resulting in lower ranges of board brightness, the effect of the filler brightness is more pronounced than if the board brightness is in the higher ranges.

The use of titanium dioxide in the top liner increases its opacity and brightness to such an extent that it is possible to cover a filler of low brightness and secure a good ultimate board brightness, even at low liner weights.

It is probably more feasible to increase board brightness by increasing the opacity and the brightness of the liner than by increasing the brightness of the filler.

### Literature Cited

(1) Willets, W. R., Bingham, R. T. and Eriksen, L. H. Factors affecting lined board brightness. *Tech. Assoc. Papers*, XXII, 179-182 (1939).

**APPENDIX 1—HEAVY WEIGHT LINERS**
**(Run 1)**
**LINER SHEET DATA**

| Filler Brightness Per cent | Titanium Dioxide: Per cent Added | Titanium Dioxide: Per cent Content | Basis Wgt. Lb. (25x38—500) | Caliper in./1000 | Bausch & Lomb: Opacity Per cent | Bausch & Lomb: Brightness Per cent | Lined Board Brightness Per cent |
|---|---|---|---|---|---|---|---|
| 39.6 | 0 | 0 | 78.4 | 6.2 | 94.2 | 79.4 | 77.4 |
| 39.6 | 1 | 0.52 | 76.5 | 7.0 | 93.9 | 81.5 | 78.0 |
| 39.6 | 2 | 1.06 | 78.3 | 6.5 | 95.1 | 81.7 | 78.9 |
| 39.6 | 3 | 1.54 | 78.3 | 6.6 | 95.5 | 82.8 | 79.9 |
| 39.6 | 4 | 2.11 | 78.6 | 6.9 | 96.0 | 82.9 | 80.8 |
| 45.2 | 0 | 0 | 78.4 | 6.2 | 94.2 | 79.4 | 77.5 |
| 45.2 | 1 | 0.52 | 76.5 | 7.0 | 93.9 | 81.5 | 78.3 |
| 45.2 | 2 | 1.06 | 78.3 | 6.5 | 95.1 | 81.7 | 78.9 |
| 45.2 | 3 | 1.54 | 78.3 | 6.6 | 95.5 | 82.8 | 80.0 |
| 45.2 | 4 | 2.11 | 78.6 | 6.9 | 96.0 | 82.9 | 80.8 |
| 56.0 | 0 | 0 | 78.4 | 6.2 | 94.2 | 79.4 | 78.3 |
| 56.0 | 1 | 0.52 | 76.5 | 7.0 | 93.9 | 81.5 | 79.3 |
| 56.0 | 2 | 1.06 | 78.3 | 6.5 | 95.1 | 81.7 | 80.0 |
| 56.0 | 3 | 1.54 | 78.3 | 6.6 | 95.5 | 82.8 | 80.3 |
| 56.0 | 4 | 2.11 | 78.6 | 6.9 | 96.0 | 82.9 | 81.7 |
| 75.5 | 0 | 0 | 78.4 | 6.2 | 94.2 | 79.4 | 79.6 |
| 75.5 | 1 | 0.52 | 76.5 | 7.0 | 93.9 | 81.5 | 80.5 |
| 75.5 | 2 | 1.06 | 78.3 | 6.5 | 95.1 | 81.7 | 81.1 |
| 75.5 | 3 | 1.54 | 78.3 | 6.6 | 95.5 | 82.8 | 81.7 |
| 75.5 | 4 | 2.11 | 78.6 | 6.9 | 96.0 | 82.9 | 82.3 |

**APPENDIX 2—MEDIUM WEIGHT LINERS**
**(Run 2)**
**LINER SHEET DATA**

| Filler Brightness Per cent | Titanium Dioxide: Per cent Added | Titanium Dioxide: Per cent Content | Basis Wgt. Lb. (25x38—500) | Caliper in./1000 | Bausch & Lomb: Opacity Per cent | Bausch & Lomb: Brightness Per cent | Lined Board Brightness Per cent |
|---|---|---|---|---|---|---|---|
| 40.7 | 0 | 0 | 56.2 | 4.0 | 78.1 | 79.3 | 69.5 |
| 40.7 | 1 | 0.56 | 56.7 | 4.4 | 81.9 | 82.1 | 72.1 |
| 40.7 | 2 | 1.22 | 57.3 | 4.7 | 85.4 | 83.5 | 74.0 |
| 40.7 | 3 | 1.89 | 56.6 | 4.4 | 86.8 | 84.1 | 76.2 |
| 40.7 | 4 | 2.47 | 56.7 | 4.8 | 88.2 | 85.2 | 77.7 |
| 44.9 | 0 | 0 | 56.2 | 4.0 | 78.1 | 79.3 | 69.9 |
| 44.9 | 1 | 0.56 | 56.7 | 4.4 | 81.9 | 82.1 | 72.7 |
| 44.9 | 2 | 1.22 | 57.3 | 4.7 | 85.4 | 83.5 | 75.0 |
| 44.9 | 3 | 1.89 | 56.6 | 4.4 | 86.8 | 84.1 | 76.2 |
| 44.9 | 4 | 2.47 | 56.7 | 4.8 | 88.2 | 85.2 | 78.2 |
| 54.9 | 0 | 0 | 56.2 | 4.0 | 78.1 | 79.3 | 72.9 |
| 54.9 | 1 | 0.56 | 56.7 | 4.4 | 81.9 | 82.1 | 75.1 |
| 54.9 | 2 | 1.22 | 57.3 | 4.7 | 85.4 | 83.5 | 77.3 |
| 54.9 | 3 | 1.89 | 56.6 | 4.4 | 86.8 | 84.1 | 78.5 |
| 54.9 | 4 | 2.47 | 56.7 | 4.8 | 88.2 | 85.2 | 79.4 |
| 76.7 | 0 | 0 | 56.2 | 4.0 | 78.1 | 79.3 | 78.9 |
| 76.7 | 1 | 0.56 | 56.7 | 4.4 | 81.9 | 82.1 | 80.4 |
| 76.7 | 2 | 1.22 | 57.3 | 4.7 | 85.4 | 83.5 | 81.5 |
| 76.7 | 3 | 1.89 | 56.6 | 4.4 | 86.8 | 84.1 | 82.3 |
| 76.7 | 4 | 2.47 | 56.7 | 4.8 | 88.2 | 85.2 | 83.0 |

**APPENDIX 3—LIGHT WEIGHT LINERS**
**(Run 3)**
**LINER SHEET DATA**

| Filler Brightness Per cent | Titanium Dioxide: Per cent Added | Titanium Dioxide: Per cent Content | Basis Wgt. Lb. (25x38—500) | Caliper in./1000 | Bausch & Lomb: Opacity Per cent | Bausch & Lomb: Brightness Per cent | Lined Board Brightness Per cent |
|---|---|---|---|---|---|---|---|
| 38.3 | 0 | 0 | 38.0 | 3.1 | 65.4 | 77.8 | 64.1 |
| 38.3 | 1 | 0.51 | 38.7 | 3.5 | 70.9 | 82.0 | 68.0 |
| 38.3 | 2 | 1.08 | 38.4 | 3.1 | 74.9 | 83.0 | 70.9 |
| 38.3 | 3 | 1.71 | 38.7 | 3.2 | 77.1 | 83.5 | 71.8 |
| 38.3 | 4 | 2.26 | 38.5 | 3.5 | 78.6 | 84.1 | 73.2 |
| 46.2 | 0 | 0 | 38.0 | 3.1 | 65.4 | 77.8 | 66.0 |
| 46.2 | 1 | 0.51 | 38.7 | 3.5 | 70.9 | 82.0 | 70.0 |
| 46.2 | 2 | 1.08 | 38.4 | 3.1 | 74.9 | 83.0 | 72.2 |
| 46.2 | 3 | 1.71 | 38.7 | 3.2 | 77.1 | 83.5 | 73.4 |
| 46.2 | 4 | 2.26 | 38.5 | 3.5 | 78.6 | 84.1 | 74.8 |
| 55.1 | 0 | 0 | 38.0 | 3.1 | 65.4 | 77.8 | 69.4 |
| 55.1 | 1 | 0.51 | 38.7 | 3.5 | 70.9 | 82.0 | 72.6 |
| 55.1 | 2 | 1.08 | 38.4 | 3.1 | 74.9 | 83.0 | 74.1 |
| 55.1 | 3 | 1.71 | 38.7 | 3.2 | 77.1 | 83.5 | 75.4 |
| 55.1 | 4 | 2.26 | 38.5 | 3.5 | 78.6 | 84.1 | 76.3 |
| 77.9 | 0 | 0 | 38.0 | 3.1 | 65.4 | 77.8 | 78.2 |
| 77.9 | 1 | 0.51 | 38.7 | 3.5 | 70.9 | 82.0 | 80.1 |
| 77.9 | 2 | 1.08 | 38.4 | 3.1 | 74.9 | 83.0 | 80.9 |
| 77.9 | 3 | 1.71 | 38.7 | 3.2 | 77.1 | 83.5 | 81.8 |
| 77.9 | 4 | 2.26 | 38.5 | 3.5 | 78.6 | 84.1 | 82.3 |

# Effect of Mechanical Gelatinization On the Solubility of Wood In Cuprammonium Solution*

By John Levy[1] and Edwin C. Jahn[2]

**Abstract**

*The solubility of northern white pine mechanical pulp in cuprammonium solution of standard strength for TAPPI viscosity measurements was determined after each of the following treatments: (a) no treatment, (b) treated with hot 4 per cent NaOH solution, (c) treated with hot 4 per cent NaOH solution and then beaten in a rod mill in 2 per cent NaOH solution for 40 hr., (d) beaten in a rod mill in water for 40 hours. The percentage solubility in each case is (a) 15.8, (b) 21.8, (c) 32.2, (d) 27.15. The great increase in solubility caused by mechanical gelatinization, which greatly increases the surface area of the wood, increases the solubility of the cellulose fraction of the wood. Alkaline treatment increases solubility presumably due to the softening and swelling of the wood particles and to the slight removal of lignin and hemicelluloses.*

*Cuprammonium solution exerts a selective solvent action on the constituents of both gelatinized and ungelatinized wood. The soluble fractions are over 90 per cent cellulose. About 50 per cent of the original cellulose, 5.5 per cent of the original lignin, and 13 per cent of the original pentosans are dissolved from northern white pine groundwood pulp mechanically gelatinized in dilute alkali.*

The resistance of wood to cellulose solvents and the difficulty of separating cellulose from lignin and the other constituents of wood led to the conclusion of Cramer *(2)*, Fremy *(4)* and others in the middle of the last century that lignin and cellulose were chemically combined. Whether or not this is the case is still unsolved, although there are several recent pieces of evidence in favor of a lignin-hemicellulose combination.

The fact that wood can be mechanically gelatinized to a smooth, slimy paste makes gelatinization a procedure well adapted for study of the chemical properties and behavior of wood. The purpose of this study is to investigate the comparative solubility in Schweizer's reagent of gelatinized and ungelatinized wood, to analyze the original materials, and the soluble and insoluble fractions.

Soon after the discovery of Schweizer's reagent, it was observed that it had very little affect on wood whereas it readily dissolved cellulose. However, Hoffmeister *(10)* reported that if lignocellulose is subjected to alternate treatment with hydrochloric or acetic acid and ammonia, the cellulose portion can be completely dissolved in cuprammonium solution. An alternate mild hydrolysis and cuprammonium extraction is the basis of Freudenberg's *(5, 6)* method of isolating a lignin residue.

Finely divided wood is partially soluble in cuprammonium solution without prior hydrolytic treatment. Cross and Bevan *(3)* reported that the soluble portion has the same ultimate composition as the original lignocellulose, which supported their theory of a lignin-cellulose compound. Schorger *(12)*, however, failed to obtain a cuprammonium soluble fraction of constant composition. By grinding birch for 72 hr. with cuprammonium solution and treating the residue with fresh cuprammonium, Schorger found the residue to contain 34 per cent lignin, 10 per cent pentosans, and 56 per cent cellulose, and the soluble part contained about 13.5 per cent lignin and 38 per cent pentosans.

Staudinger, Dreher, and Ekenstam *(13)* found that Schweizer's reagent dissolved only 3.6 per cent of spruce meal after 48 hr., but that, if the meal were ground in a porcelain ball mill 12 to 40 hr. in either the wet or dry condition, 30 to 50 per cent of the original cellulose dissolved. These investigators believe that the cellulose in wood consists of long fiber-like molecules combined in macromolecules of three dimensions which are insoluble in Schweizer's reagent. They also admit that the cellulose molecules may be bound with lignin. Beating the wood, they believe, causes a rupture of the macromolecules, resulting in greater solubility of the cellulose in Schweizer's reagent. Beating also causes a decrease in the degree of polymerization of the cellulose, according to these authors.

Hilpert *(7, 8, 9)* in recent studies on the solubility of wood and other plant materials in Schweizer's reagent and in ethylenediamine—copper oxide solutions concludes that free cellulose is not dissolved, since the precipitates from the solution contain 2 to 3 per cent methoxyl and have a carbon and hydrogen composition intermediate between cellulose and the original material. Hilpert and Woo *(9)* find that nitrogen is introduced into both the insoluble and soluble fractions; spruce residue containing 1.8 per cent nitrogen and the precipitate about 1 per cent nitrogen. For this reason Hilpert and Pfützenreuter *(7)* claim ethylenediamine-copper oxide a better solvent. They report that in this solvent about 60 per cent of white beech wood dissolves and that the residue has about the same chemical composition as the original wood, except for a rise in methoxyl content from 6 up to 8 per cent. They find that the lignin contents of the residues are not changed by dissolving out the "cellulose," although methylated complexes dissolve, which, with acids give "methylated lignins" in small amounts. They claim that this evidence disproves the concept of a carbohydrate-lignin complex. In another paper these authors *(8)* give the percentage of material insoluble in cupram-



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monium solution from a number of species. They find that hardwoods are more soluble (about 25-30 per cent) than conifers (about 20 per cent, with Taxus and Gingko hardly attacked).

Analysis of the comparatively scant literature on the solubility of wood in cuprammonium solvent reveals no definite or conclusive evidence excluding or supporting a possible lignin-carbohydrate complex, the conclusions of Hilpert notwithstanding.

## Experimental Procedure

Northern white pine (*Pinus strobus* Linnaeus) screened groundwood pulp, prepared by seniors in pulping course under the direction of Professor W. O. Hisey, New York State College of Forestry, was used for these studies. The wood was obtained from a plantation at Warrensburg, N. Y. The pulp was prepared on a Norton no. 30 grit stone, turning at a peripheral speed of 3000 ft. per min., and under a pocket pressure of 40 lb. per sq. inch. The stone was faced with a 1½ inch lead no. 3 pitch burr and had been used for 30 hr. previous to this work. The pit temperature was 160 deg. F.

The pulp was air dried to a moisture content of 6 per cent. A portion was ground in a Wiley mill and screened. The 60-80 mesh portion was used for analyses, and determining the cuprammonium solubility of the original pulp.

### Gelatinization in Dilute Alkali

Prior to beating in the rod mill 420 g. of air dry pulp were steeped in a 4 per cent solution of NaOH (90 g. NaOH and 2110 cc. of water, giving a pulp consistency of 16 per cent) for 2 hr. in a boiling water bath. The mixture was then allowed to stand at room temperature for 8 hours. Sufficient water (2630 cc.) was then added to reduce the alkali concentration to approximately 2 per cent and the consistency to 8 per cent. The mixture was poured into an Abbe bronze mill 14.25 in. long and 10 in. diam., internal dimensions; containing 25 stainless steel rods, each 14 in. long and weighing 1425 grams. The mixture was beaten at 34 r.p.m. for 40 hours. The gelatinized wood was drained and washed with water until the wash water was neutral to litmus paper, washed with distilled water and then filtered and pressed on a suction filter. The smooth, slimy, olive-green gelatinized wood was sealed in fruit jars, and to each jar were added 2 cc. of toluene to prevent organic growth.

### Steeping in Dilute Alkali

In order to determine separately, the effect of the alkali used in the above gelatinization on the chemical composition and cuprammonium solubility of the groundwood pulp, a quantity of pulp was brought to 16 per cent consistency in 4 per cent NaOH solution and heated 2 hr. on a water bath. After removal from the water bath and standing for 8 hr. at room temperature, the mixture was diluted to 8 per cent consistency. It was then allowed to stand for 40 hr. to compare with the beating period, after which it was drained and washed with water until neutral. After air drying, the pulp was ground in a Wiley mill and the 60-80 mesh portion retained for analysis.

### Gelatinization in Water

In order to determine the cuprammonium solubility of pine groundwood pulp gelatinized in distilled water, 420 g. air dry pulp were beaten at 8 per cent consistency in 4830 g. of distilled water for 40 hr. in the above described rod mill. The gelatinized wood was drained, filtered, and stored in sealed jars, each containing 2 cc. of toluene.

### Determination of Cuprammonium Solubility

Cuprammonium solubilities were determined on the original northern white pine mechanical pulp ground to 60-80 mesh, the pulp gelatinized in dilute alkali, gelatinized in distilled water, and steeped in dilute alkali (ground to 60-80 mesh). The solubilities were determined with solutions having the strength specified in the TAPPI standard procedure *(14)* for determining the cuprammonium disperse viscosity of pulp, namely a Cu concentration of 14.8-15.2 g. per l. and a $NH_3$ content of 190-210 g. per liter. The cuprammonium solution was prepared by drawing air through shredded copper foil immersed in concentrated ammonia. Since the gelatinized wood contains over 60 per cent water and cannot be dried without altering its properties, it was necessary to prepare the cuprammonium solution with a higher original Cu and $NH_3$ content, so that when the wet gelatinized wood was added, the resulting solution would be within the specified limits. In order to get the necessary high concentration of $NH_3$ to accommodate the subsequent dilution, $NH_3$ gas was bubbled into the cuprammonium solution until the desired Cu : $NH_3$ ratio was obtained. Since the gelatinized wood had the highest water content of the materials used, the cuprammonium concentration was adjusted for it, and for the other pulps the solution was diluted with the required amount of water.

The cuprammonium extraction of the pulps was carried out in pyrex test tubes 6 in. long, each fitted with a rubber stopper and covered with heavy paper to exclude light. The volume of each tube, to a mark just under the stopper, was carefully measured. The calculated amount of wood was placed into the tubes and the exact amount of cuprammonium solution added to give the specified concentration of Cu and $NH_3$ after mixing with the sample. The oven-dry weights of material used and the total volumes of the cuprammonium solution in the mixture are as follows:

| Material treated | Oven-dry weight of sample, grams | Total volume, cuprammonium solution, cc. |
|---|---|---|
| Original groundwood pulp | .695 | 27.0 |
| Original groundwood pulp | .685 | 25.5 |
| Pulp steeped in alkali | .675 | 24.2 |
| Pulp steeped in alkali | .663 | 26.8 |
| Pulp gelatinized in water | .775 | 25.5 |
| Pulp gelatinized in water | .836 | 25.6 |
| Pulp gelatinized in dilute alkali | .947 | 25.5 |
| Pulp gelatinized in dilute alkali | .924 | 26.6 |

Into each tube was placed a metal wedge to stir the mixture. The tubes were placed on a rotating wheel in a room at a constant temperature of 70 deg. F. and rotated for 24 hours. At the end of this period the contents of each tube were centrifuged. The supernatant liquid was filtered through a fritted glass crucible having an asbestos mat. The residue in the centrifuge bottle was broken up in ammonium hydroxide (210 g. per l.), centrifuged, and the supernatant liquid filtered through the same crucible. The procedure was then repeated with ammonium hydroxide until the copper was washed out, and then with distilled water, 1 per cent acetic acid, and finally

with distilled water. The residue was then completely removed to the crucible and thoroughly washed with distilled water, dried at 105 deg. C. and weighed.

### Separation of Cuprammonium Soluble and Insoluble Fractions

Approximately 9 g. (o.d. basis) of the original pulp (60-80 mesh), pulp steeped in alkali (60-80 mesh), and pulp gelatinized in dilute alkali were treated with about 300 cc. (total final volume) of cuprammonium solution. The calculated amounts of wood and cuprammonium solution to give the specified Cu and $NH_3$ concentrations were placed in the tubes ⅞ in. inside diam. and 2¾ ft. long, so that the tubes were completely filled to exclude air. The tubes were wrapped in heavy paper to shut out light. A metal bolt about ½ by 2½ in. was placed in each tube to agitate the mixture, and they were tightly stoppered with rubber stoppers. They were rotated on a wheel for 24 hr. at 70 deg. F. The contents of each tube were transferred to centrifuge bottles, and the solids thrown down. The clear supernatant liquid was filtered through a small Büchner funnel having an asbestos mat on a screen in order to remove any suspended material. The residues were washed in the centrifuge twice with fresh cuprammonium solution, the filtrates being added to the original, with 210 g. per 1. of ammonium hydroxide and then with water until neutral. The residues at this stage were greenish in color due to sorbed copper compounds. These were removed by washing with 0.5 per cent acetic acid and then with water until neutral. The residues were then dried, pulverized, and analyzed.

The cuprammonium filtrates (original plus washings) were acidified with HCl, while being stirred and cooled with water, until a precipitate began to form. Acetic acid was used to complete the precipitation of the dissolved wood substance. When the solution was just acid to litmus, it was immediately filtered. The precipitate was washed with water, 0.5 per cent acetic acid to remove sorbed copper compounds, followed by distilled water until the washings were neutral to litmus. The precipitate was partially air dried, broken up, completely air dried, ground, and analyzed.

The residues from the original groundwood pulp and from the alkali steeped material were light brown in color, and from the gelatinized wood a pale olive color. The dried precipitates from the cuprammonium solution had the following colors: original wood—light brown, alkali steeped wood—very light brown, and gelatinized wood—brownish white.

### Analytical Procedures

*Ash, Extractives, Lignin, and Pentosans.* The various materials were analyzed for ash, ether soluble material, alcohol-benzene soluble material, and lignin, according to the methods of the Forest Products Laboratory *(1)*. The pentosans in the noncuprammonium extracted woods were also determined by the Forest Products Laboratory method. Pentosans in the cuprammonium soluble and insoluble fractions were determined by the method of Powell and Whitaker *(11)*.

*Analysis of Liquor after Beating.* After steeping in alkali and then beating for 40 hr. in 2 per cent NaOH, appreciable material is dissolved from the wood. To determine the precipitatable solids, 25 cc. of filtered beating liquor, which is a wine red color, were neutralized by HCl to a *p*H of 7 as measured by a *p*H meter. Then 2.5 cc. of concentrated HCl were added, and after the precipitate had settled it was filtered on a tared Gooch crucible and weighed.

The pentosans in the alkaline beating liquor were determined. A 50 cc. filtered portion was neutralized with dilute HCl to a *p*H of 7. Sufficient concentrated HCl was then added to make a 12 per cent solution, and then 12 per cent HCl added to make the total volume of the solution 100 cu. centimeters. The solution was then distilled and the furfural determined by precipitation with phloroglucinol.

The results of the analysis of the beating liquor, after 40 hr. beating in 2 per cent NaOH, are as follows:

| Analysis for: | Material per 100 cc. beating liquor, grams | Original wood in beating liquor, per cent |
|---|---|---|
| Solids precipitated by HCl | .1872 | 0.23 |
| Pentosans | .1964 | 0.24 |

*Cellulose.* Cellulose was determined in the various materials by dissolution of the noncellulosic constituents in anhydrous monoethanolamine at 170 deg. C. according to the procedure of Wise, Peterson, and Harlow *(16)*. The very finely divided nature of the particles of the gelatinized wood and the cupram-

TABLE I.—ANALYSIS OF ORIGINAL, ALKALI STEEPED, AND GELATINIZED PINE GROUNDWOOD BEFORE AND AFTER CUPRAMMONIUM FRACTIONATION [1]

| | Original Materials | | | | Residues insoluble in cuprammonium solution | | | Precipitated cuprammonium soluble fractions | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Analysis | Groundwood white pine pulp | Groundwood pulp steeped in dilute alkali | Groundwood pulp gelatinized in water | Groundwood pulp gelatinized in dilute alkali | Groundwood pulp | Pulp steeped in alkali | Gelatinized in dilute alkali | Groundwood pulp | Pulp steeped in alkali | Gelatinized in dilute alkali |
| Ash [2] | 0.44 | .... | .... | 5.62 | .84 | .93 | 4.36 | ... | ... | ... |
| | 0.43 | .... | .... | 5.57 | .88 | .88 | 4.27 | ... | ... | ... |
| Ether soluble material | 2.14 | .... | .... | .... | .... | .... | .... | ... | ... | ... |
| | 2.16 | .... | .... | .... | .... | .... | .... | ... | ... | ... |
| Alcohol-benzene soluble material | 1.20 | .... | .... | .... | .... | .... | .... | ... | ... | ... |
| | 1.21 | .... | .... | .... | .... | .... | .... | ... | ... | ... |
| Cuprammonium [2] soluble material | 16.35 | 21.37 | 28.00 | 33.05 | .... | .... | .... | ... | ... | ... |
| | 15.30 | 22.35 | 26.30 | 31.40 | 35.40 | 40.50 | 49.25 | 6.84 | 2.43 | 5.16 |
| Lignin | 29.55 | 28.82, 28.72 [2, 3] | .... | 29.95 | 35.50 | 39.70 | 49.20 | 7.06 | 2.49 | 5.37 |
| | 29.85 | 29.28, 29.14 [2, 4] | .... | 29.95 | 54.40 | 50.30 | 39.05 | ... | ... | [6] ... |
| Cellulose | 61.40, 61.50 | 63.80, 64.12 [2, 3] | .... | 63.40 | 54.20 | 50.00 | 38.40 | ... | ... | 95.30 |
| | 61.50, 61.10 | 63.80, 63.40 [2, 5] | .... | 62.20 | 10.20 | 10.42 | 10.45 | 4.92 | 5.01 | 4.50 |
| Pentosan | 11.85 | 12.00, 11.70 [2, 3] | .... | 10.15 | 10.20 | 10.45 | 10.47 | ... | 5.26 | 4.01 |
| | 11.77 | 11.13, 11.00 [2, 4] | .... | 10.16 | 4.60 | 5.97 | 6.30 | ... | ... | 0.32 |
| Methoxyl | 4.64 | 4.31 [2] | .... | 4.39 | 4.75 | 6.01 | 6.28 | ... | ... | 0.43 |
| | 4.66 | 4.32 | .... | 4.50 | .... | .... | 6.25 | ... | ... | ... |
| Sum of lignin, cellulose and pentosan | 102.9 | 104.35 | .... | 102.9 | 100.8 | 101.2 | 98.4 | ... | ... | 104.8 |

[1] All results expressed in per cent of oven-dry ash-free material unless otherwise indicated.
[2] Per cent oven-dry material, not corrected for ash.
[3] Analysis by Philip Bloom.
[4] Analysis by W. F. Murphy.
[5] Analysis by W. Reynolds.
[6] By Cross and Bevan method.

TABLE II.—ANALYSIS OF CUPRAMMONIUM INSOLUBLE AND SOLUBLE FRACTIONS EXPRESSED (AVERAGE VALUES) IN PER CENT OF TOTAL WOOD AND IN PER CENT OF INDIVIDUAL CONSTITUENTS

| | Residues insoluble in cuprammonium solution | | | | | | Precipitated cuprammonium soluble fractions | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Per cent of total wood (before extraction with cuprammonium) | | | Per cent of total constitutent (lignin, etc.) of wood (before extraction with cuprammonium) | | | Per cent of total wood (before extraction with cuprammonium) | | | Per cent of total constituent (lignin,etc.) of wood (before extraction with cuprammonium) | | |
| Analysis | Groundwood pulp | Pulp steeped in alkali | Gelatinized in dilute alkali | Groundwood pulp | Pulp steeped in alkali | Gelatinized in dilute alkali | Groundwood pulp | Pulp steeped in alkali | Gelatinized in dilute alkali | Groundwood pulp | Pulp steeped in alkali | Gelatinized in dilute alkali |
| Lignin ..... | 29.8 | 31.4 | 33.4 | 100.5 | 108.5 | 111.5 | 1.1 | 5.4 | 1.7 | 3.7 | 1.9 | 5.7 |
| Cellulose ..... | 45.7 | 39.2 | 26.3 | 74.5 | 61.5 | 41.8 | .. | .. | 30.7 | 23–25* | 32–39* | 48.8 |
| Pentosan .... | 8.6 | 8.2 | 7.1 | 71.9 | 70.6 | 69.9 | .78 | 1.1 | 1.4 | 6.6 | 9.7 | 13.4 |
| Methoxyl .... | 3.9 | 4.7 | 4.3 | 84.7 | 108.3 | 96.7 | .. | .. | 0.12 | ... | ... | 2.8 |

Estimated on basis cellulose in residue and pentosans and lignin in precipitate.

monium soluble fractions made the use of the usual Cross and Bevan procedure very difficult due to plugging of the crucibles. This also resulted in longer exposure to the reagents and hence losses due to degradation. No particular difficulties were encountered in the use of the monoethanolamine on these materials.

*Methoxyl.* Percentage methoxyl was determined by the method of Vieböck and Schwappach *(15)*, whereby methyl iodide formed by the action of HI on methoxyl containing substances is absorbed in an acetic acid solution of potassium acetate and bromine. Instead of using 6 cc. of HI, 15 were used and no phosphorus was added to the reaction flask. The apparatus used was slightly different and consisted of a reaction flask with a side arm for admitting $CO_2$ purified by passing through an $H_2SO_4$ scrubber, a Vigreux column as an air condenser, and 2 absorption tubes.

To determine the accuracy of this setup for the determination of methoxyl it was checked on crystalline vanillin. The percentage methoxyl found was 20.30 and 20.35 or an average of 20.33, which is very close to the theoretical value of 20.38 per cent.

## Discussion of Results

The results of this study are recorded in Table I where the values are given in percentage of the material analyzed. In Table II, the averages of these same figures for the cuprammonium soluble and insoluble fractions are expressed in percentage of the total wood and in percentage of the total individual constituents in the wood prior to cuprammonium extraction.

The solubility of northern white pine mechanical pulp, ground dry in a cutting mill to 60-80 mesh, in cuprammonium solution under the conditions used was 15.8 per cent; the same pulp after steeping in 4 per cent NaOH solution, and then ground dry in a cutting mill to 60-80 mesh, was 21.8 per cent soluble, after mechanical gelatinization in distilled water for 40 hr., it was 27.15 per cent soluble, and after mechanical gelatinization in dilute alkali it was 32.2 per cent soluble. The great increase in solubility caused by mechanical gelatinization is apparently due to increasing the cellulose surface exposed by greatly increasing the total particle surface. Alkaline treatment increases solubility, presumably due to softening and swelling the wood particles, and to the slight removal of lignin and pentosans.

Cuprammonium solution exerts a selective action on the constituents of both gelatinized and ungelatinized wood. The soluble fractions are about 90 per cent cellulose. About 50 per cent of the original cellulose, only 5.7 per cent of the original lignin, and about 13 per cent of the original pentosans in gelatinized northern white pine are present in the precipitate obtained from the cuprammonium extract of the gelatinized wood. Mechanical gelatinization greatly increases the amount of cellulose which can be dissolved from white pine wood. The greater the solubility of a treated white pine wood, the greater the lignin and methoxyl content of the residue, since very little of the lignin or methoxyl containing substance is removed. These facts are contrary to the findings of Hilpert and Pfützenreuter *(7)* who claim that the lignin content of the residues is not changed by the action of ethylenediamine-copper oxide. The pentosan content of the residues remain about constant, regardless of the solubility of the wood (about 10.4 per cent or 70 per cent of the original), and the pentosan content of the precipitates is also about constant (4-5 per cent). These facts indicate that alkaline steeping or mechanical gelatinization of white pine increases the availability of cellulose for solution, that the amount of pentosan dissolved is about constant (but the amount precipitated is not constant), and that very little lignin is dissolved.

The percentage of any one total constituent of the original wood (prior to extraction with cuprammonium solution) in the residue plus the percentage in the precipitate should approximate 100 per cent. The lignin values are high, actually over 100 per cent in the residues alone, whereas the sum of the cellulose percentages is somewhat under 100 per cent, and the pentosans appreciably under 100 (about 80 per cent). This indicates that losses in carbohydrates, particularly pentosans, occur. Probably not all the material is precipitated from the cuprammonium solvent on acidification. Other smaller sources of error in the calculated figures may be due to difficulty in getting checks on solubility values closer than 1 per cent, the reagents for the lignin and cellulose analytical procedures may affect the very finely divided precipitated material somewhat differently (slight degradation, etc.), and the added values for cellulose, pentosan, and lignin are not truly summative. The calculated values in Table II, however, are approximations of the true values and definitely indicate what constituents are or are not removed by cuprammonium solution and in what proportions. The percentage of the original cellulose dissolved from the gelatinized wood is approximately the same as the higher value (50 per cent) reported by Staudinger, Dreher, and Ekenstam *(13)* who beat spruce meal in a ball mill.

Mechanical gelatinization of wood increases the availability of the cellulose portion for solution in cuprammonium hydrate. Gelatinization increases the wood surface and presumably the cellulose surface exposed, and it might be considered evidence in support of the physical theory of a cellulose and lignin admixture. However, a possible chemical combination cannot be excluded, because even after the wood

is beaten until its wall structure is largely broken down and it is a smooth, slimy paste, about 50 per cent of the cellulose remains insoluble under the conditions used.

### Conclusions

The solubility of 60-80 mesh northern white pine groundwood pulp in cuprammonium solvent (14.8-15.2 g. Cu and 190-210 g. $NH_3$ per l.) after 24 hr. treatment at 70 deg. F. is about 16 per cent.

The same pulp steeped in dilute alkali is about 22 per cent soluble in Schweizer's reagent.

White pine mechanical pulp gelatinized in distilled water in a rod mill for 40 hr. is about 27 per cent soluble in Schweizer's reagent.

White pine mechanical pulp gelatinized in 2 per cent NaOH solution in a rod mill for 40 hr. is about 32 per cent soluble in Schweizer's reagent.

Cuprammonium solution exerts a selective action on the constituents of the wood, dissolving mainly cellulose. The cuprammonium soluble fractions (precipitated) are about 90 per cent cellulose, 5 per cent pentosans, and 2.5-7 per cent lignin.

About 50 per cent of the original cellulose is present in the precipitated cuprammonium soluble fraction from highly gelatinized wood, and only 5.7 per cent of the original lignin and 13.4 per cent of the original pentosans.

A portion of the carbohydrate material (mainly pentosans) is not accounted for in the sum of the insoluble and precipitated soluble fractions, and apparently is not precipitated from the cuprammonium solution.

Gelatinization, which causes a great increase in surface area of the wood, increases the solubility of the cellulose fraction of the wood. The solubility of the wood increases in the following order, untreated mechanical pulp, steeping in alkali, gelatinization in water, gelatinization in dilute alkali.

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# Review Of Paper Industry Literature

**Copies of United States Patents can be obtained from the United States Patent Office, Washington, D. C. for 10 cents each. Send currency, not stamps.**

### Miscellaneous Digesting Methods

**Pulping Process.** I. G. Farbenindustrie A.-G. Brit. pat. 493,713 (Oct. 12, 1938).—Vegetable fibrous material, such as wood, straw, grasses, is impregnated in a pressure vessel with a solution of nitric acid of 10 to 15 per cent concentration by volume under vacuum and air then introduced to provide an excess pressure of several (e.g., 5) atmospheres, or excess pressure is allowed to build up and the temperature raised gradually (e.g., for 3 hrs.) from its initial value of 30 deg. to 40 deg. C. to 40 deg. to 50 deg. C., the surplus acid is then displaced by hot water (e.g., at 80 deg. to 85 deg. C.) and the disintegration is completed during 6 to 8 hrs. at 70 deg. to 90 deg. C. at ordinary pressure if a medium or highly viscous pulp is required or at raised pressure (e.g., 1 to 2 atmospheres) for a pulp of low viscosity. The excess pressure produced or obtained during the first nitric acid treatment is maintained substantially constant at 5 atmospheres by blowing off the carbon dioxide produced. The acid removed after the initial impregnation may be made up to strength and reused.—A.P.-C.

**Process of Impregnating Wood Chips.** Fredrich Olsen, assignor to The Cellulose Research Corporation. U. S. pat. 2,137,779 (Nov. 22, 1938).—Relatively flat wood pieces of chip size or smaller are immersed in an aqueous liquid such as alum solution and heated in the liquid to its boiling point at not less than atmospheric pressure and the boiling is continued until the discharge of air ceases, thereafter the temperature and pressure conditions being adjusted to those at which steam is condensed in the wood pieces, while they are submerged in the impregnating liquid. Such conditions and submergence are continued until impregnation with the liquid is complete, while maintaining the pieces in an air-excluding medium continuously from the boiling treatment to the completion of impregnation, a delignifying reagent being introduced into the wood pieces by the impregnating liquid at a temperature below that of active delignification. The mass of wood is heated in a submerging fluid medium to the range of temperatures of active reaction by the reagent and the wood pieces are digested with the reagent to form pulp.—A.P.-C.

**Manufacture of Paper Board from Straw with Simultaneous Production of Furfuraldehyde.** W. J. Tennant, assignee of Henkel & Co. G.m.b.H. Brit. pat. 494,669 (March 25, 1937).—Straw is heated with an acid (e.g., quarter-normal sulphuric acid) at 100 deg. C. for about one and a half hrs. so that about 60 per cent of its pentosans are removed. These are recovered as furfuraldehyde by distillation from the separated cooking liquor at 140 deg. to 160 deg. C. The straw residue is then passed, washed, and heated under pressure with aqueous slaked lime, when a pulp of high folding resistance is obtained.—A.P.-C.

**Improvement to the Fermentation of Incrusted Cellulosic Fibers for the Production of Paper Pulp.** Universal Cellulose (Proprietary) Ltd. Belg. pat. 428,493 (Aug. 31, 1938).—Cut and crushed cellulosic material is impregnated with a liquid containing bacteria which have been cul-

tivated on the material or on a product derived therefrom. The mass is fermented in presence of air, washed, pressed into bales and air-dried in open piles.—A.P.-C.

### Bleaching

**Process for Producing a Pure White Cellulose.** Erik B. F. Sunesson, assignor to Uddeholms Aktiebolag. U. S. pat. 2,140,863 (Dec. 20, 1938).—An unbleached cellulose obtained by alkaline decomposition is subjected to first and third stages of bleaching with hypochlorite with an intervening second-stage bleaching with chlorine, sufficient hypochlorite being used in the first stage that up to 60 per cent of the lignin oxidizes; chlorolignin soluble in alkali is removed with sodium hydroxide after the second stage, and the pulp is washed with water after each stage.—A.P.-C.

**Method of Bleaching Pulp.** Francis G. Rawling, assignor to West Virginia Pulp and Paper Company. U. S. pat. 2,147,618 (Feb. 14, 1939).—Pulp (such as kraft) is subjected to the action of chlorine at a pH not substantially in excess of 6. The pulp is rendered alkali (as by adding sodium hydroxide) to a pH not less than 8. It is then treated in alkaline suspension with a gas containing free oxygen, and the treated pulp is bleached with alkaline hypochlorite solution.—A.P.-C.

**Bleaching Cellulosic Materials.** Maurice C. Taylor and James F. White, assignors to Mathieson Alkali Works. U. S. pat. 2,145,062 (Jan. 24, 1939).—Pulp is treated with an acid aqueous solution containing a chlorite of an alkali or alkaline earth metal without destructive action on the cellulosic material (suitably with a sodium or calcium chlorite solution with a pH of 3.4 to 5.0).—A.P.-C.

**Treatment of Unbleached, Impure, Semi-Chemical, and Like Cellulose Pulps.** U. Pomilio. Brit. pat. 487,701 (Feb. 15, 1937).—Kraft or other highly lignified pulp is shredded and treated in the moist state with chlorine gas. It is then washed and the chlorinated lignins are extracted with dilute aqueous sodium hydroxide or sodium bisulphite. The pulp is again washed and finally bleached white with hypochlorous acid. The chlorine gas is prepared electrolytically.—A.P.-C.

**Process of Bleaching and Purifying Cellulose.** John L. Parsons and Donald T. Jackson, assignors to Hammermill Paper Company. Can. pat. 379,422 (Feb. 7, 1939).—Cellulose material, such as kraft pulp, is successively subjected to the action of chlorine, acidified sodium chlorite at about 50 deg. C. and alkaline calcium hypochlorite at about 38 deg. C. The bleached pulp has a Mullen bursting strength above 60, a viscosity in cuprammonium solution above 25, and a reflectance above 80 per cent.—A.P.-C.

**Process for the Bleaching of Pulp Obtained by Alkaline Decomposition.** Uddeholms Aktiebolag, Skoghall, Sweden. Ger. pat. 654,991 (Jan. 5, 1934).—The pulp is first pre-bleached with hypochlorite, as, for example, calcium hypochlorite, which will oxydize up to 60 per cent of the lignin. The pulp is then washed by a chlorinating bleach medium, such as chlorine water, then chlorinated and the lignin chlorine formed is washed out by dilute sodium hydroxide. Finally the pulp is after-bleached by an oxydizing bleach medium such as calcium hypochlorite.—J.F.O.

**Process for the Bleaching of Kraft or Sulphate Pulp.** Mathieson Alkali Works, Ltd. Nor. pat. 58,782 (Nov. 19, 1935).—Kraft or sulphate pulp is first pre-bleached with an aqueous solution of chlorine. Then it is bleached to completion with acid alkali or earth alkali chlorite solution at temperatures of between 70 and 80 deg. C. and at a pH of about 3.5 to 5.0.—J.F.O.

**Process for the Bleaching of Sulphite Pulp.** Mathieson Alkali Works, Ltd. Nor. pat. 58,783 (Nov. 19, 1935).—Sulphite pulp is first pre-bleached with an aqueous solution of chlorine. Then it is bleached to completion with acid alkali or earth alkali chlorite solution at temperatures of about 45 deg. C. and at a pH of 3.5 to 5.0. After the chlorine bleaching, a treatment of aqueous alkali solution can be added.—J.F.O.

**Process and Device for the Drenching of Pulp or Similar Fiberous Materials with Liquids.** AS Thunes Mek Vaerksted, Skoyen. Nor. pat. 57,855 (Dec. 22, 1939).—The material is held pressed together during its immersion in the treating liquid, for example in the bleach liquor, and after the desired amount of drenching liquid has been taken up the material is removed while it still is pressed together.—J.F.O.

### Sizing

**Preparation of Alum Solution for Paper Sizing.** Judson A. DeCew. U. S. pat. 2,138,840 (Dec. 6, 1938).—A true solution of aluminum sulphate for paper sizing having a pH of 3.8 to 4.2 is prepared by the addition to an aqueous solution of commercial aluminum sulphate of an aqueous solution of lime, magnesia or soda, or their carbonates or acetates. An arrangement of apparatus is described.—A.P.-C.

**Neutral Sized Paper.** Walter A. Nivling, U. S. pat. 2,138,325 (Nov. 29, 1938).—A process of obtaining a sized substantially neutral web comprises subjecting the web-forming fibers to the action of an aqueous bath containing a colloidal dispersion of aluminum resinate, a protective colloid, and ammonia in sufficient amount to preserve in that portion of the bath in contact with the fibers a pH of at least 6.5 throughout such period of contact, and thereafter drying the web to remove water and excess ammonia and to produce a substantially neutral dried web.—A.P.-C.

**Art of Sizing Paper.** Gerould T. Lane and Ralph W. Peters, assignors to Eastman Kodak Co. U. S. pat. 2,136,110 (Nov. 8, 1938).—Paper pulp is treated before it is formed into sheets with certain vinyl resins, such as the water-soluble type produced by reaction of an aliphatic aldehyde with a polyvinyl alcohol; preferably, a cold-water-soluble resin of this type is used—A.P.-C.

**Process for the Preparation of Aqueous Dispersions Suitable for Sizing and Waterproofing Paper.** P. Muranyi. Belg. pat. 427,528 (June 30, 1938).—The dispersions are prepared from unsaponifiable matter, colloidal products and starch, the latter being disintegrated, as by the addition of an aryl sulpho-chloramide, but is not degraded to such an extent as to completely destroy its blue reaction with iodine.—A.P.-C.

# Imports of Paper and Paper Stock

## Giving Manifests of New York, Boston, Philadelphia and Other Ports of Newsprint, Wrapping, Writing, Coated, Blotting, Tissue, Strawboard, Wallboard, Cigarette Papers, Sulphite, Kraft and Ground Wood Pulp.

### NEW YORK IMPORTS

WEEK ENDING DECEMBER 2, 1939

SUMMARY

Cigarette paper .....344 cs.
Painted paper.....11 cs.
Newsprint .....1,424 rolls
Printing paper .....7 cs.
Wrapping paper .....1,216 rolls.
Filter paper .....1 cs.
Filter mass .....200 bls.
Filter compound .....25 bls.
Drawing paper.....54 cs.
Surface coated paper .....95 cs.
Decalcomanias .....11 cs.
Tissue paper .....79 cs.
Writing paper .....1 cs.
Cardboard tubes .....51 cs.
*Miscellaneous paper* .....11 bls., 10 cs.

CIGARETTE PAPER

——, ——, Havre, 235 cs.
——, *Excalibur,* Marseilles, 109 cs.

PAINTED PAPER

——, ——, Havre, 11 cs.

NEWSPRINT

Jay Madden Corp., *Savonia,* Mantypuoto, 1,028 rolls.
National Pulp & Paper Co., *Stavangerfjord,* Oslo, 396 rolls.

PRINTING PAPER

Steinee Paper Corp., *Black Eagle,* Rotterdam, 7 cs.

WRAPPING PAPER

——, *Giulia,* Genoa, 400 rolls.
Superior Paper Co., *Savonia,* Mantypuoto, 50 rolls.
Gilson Bros., Inc., *Savonia,* Mantypuoto, 261 rolls.
J. B. Harris Co., *Savonia,* Mantypuoto, 186 bls.
L. Glickman & Co., *Savonia,* Mantypuoto, 175 rolls.
Salwen Paper Co., *Savonia,* Mantypuoto, 144 rolls.

FILTER PAPER

American Express Co., ——, Bordeaux, 1 cs.

FILTER MASS

Mager Bros., *Black Tern,* Rotterdam, 50 bls.
H. Reifenberg, *Black Eagle,* Rotterdam, 150 bls.

FILTER COMPOUND

A. Gusmer, *Black Eagle,* Antwerp, 25 bls.

DRAWING PAPER

Rohner Gehrig & Co., *Black Eagle,* Rotterdam, 54 cs.

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Gevaert Co. of America, *Burgerdyk,* Rotterdam, 95 cs.

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General Motors Overseas Operations, *Burgerdyk,* Rotterdam, 11 cs.

TISSUE PAPER

Drueding Bros., Co., *Giulia,* Genoa, 10 cs. (caps).
Van Oppen & Co., *Excalibur,* Genoa, 69 cs. (uncoated).

WRITING PAPER

——, ——, Havre, 1 cs.

CARDBOARD TUBES

International F'd'g Co., *Black Tern,* Antwerp, 51 cs.

MISCELLANEOUS PAPER

——, *Stavangerfjord,* Oslo, 11 bls.
H. Reeve Angel & Co., Inc., *Kirisima Maru,* Yokohama, 10 cs.

RAGS, BAGGINGS, ETC.

W. Steck & Co., *Black Tern,* Antwerp, 22 bls. flax waste.
Hughes Fawcett, Inc., *Black Tern,* Antwerp, 82 bls. rayon waste.
Guaranty Trust Co., *Burgerdyk,* Antwerp, 1,521 bls. rayon waste.
R. Blank, *Argentina,* Buenos Aires, 52 bls. rags.
D. Benedetto, Inc., *Argentina,* Buenos Aires, 28 bls. bagging.
J. Levy & Son, *Mexico,* Havana, 18 bls., 10 bags rags.
Darmstadt Scott & Courtney, *Black Eagle,* Antwerp, 1,088 bls. jute waste.
——, *Black Eagle,* Rotterdam, 14 bls. rags.
Manufacturers Trust Co., *Nosiro Maru,* Shanghai, 100 bls. cotton waste.
Padawer & Co., *Nosiro Maru,* Shanghai, 300 bls. cotton waste.
C. Comiter, *Nosiro Maru,* Shanghai, 44 bls. cotton waste.
New England Waste Co., *Nosiro Maru,* Shanghai, 100 bls. pickers.
E. J. Keller Co., Inc., ——, Constanza, 1,050 bls. rags.

CASEIN

American British Chemical Supplies, ——, Havre, 250 bags.
Chase National Bank, *Burgerdyk,* Rotterdam, 50 bags.
H. S. Kramer Co., *Argentino,* Buenos Aires, 6 bags.
Chase National Bank, *Argentino,* Buenos Aires, 834 bags.
American British Chemical Supplies, *Argentino,* Buenos Aires, 1,018 bags.
Innes Speiden & Co., *Argentino,* Buenos Aires, 167 bags.
American British Chemical Supplies, *Black Eagle,* Antwerp, 313 bags.
——, *Donald McKay,* Buenos Aires, 2,502 bags, 150,000 kilos.
American British Chemical Supplies, *Donald McKay,* Buenos Aires, 1,298 bags, 70,040 kilos.
T. M. Duche & Son, *Donald McKay,* Buenos Aires, 1,251 bags, 75,060 kilos.
A. Hurst & Co., *Donald McKay,* Buenos Aires, 1,668 bags, 100,080 kilos.

WOOD PULP

Pulp Sales Corp., *Savonia,* Mantypuoto, 875 bls. strong sulphite, 175 tons, 300 bls. bleached sulphite, 49 tons.
The Borregaard Co., Inc., *Stavangerfjord,* Sarpsborg, 866 bls. unbleached sulphate, 147 tons.

### BOSTON IMPORTS

WEEK ENDING DECEMBER 2, 1939

Pulp Sales Corp., *Savonia,* Mantypuoto, 1,430 bls. bleached sulphite, 2,815 bls. strong sulphite.
Jay Madden Corp., *Savonia,* Mantypuoto, 94 rolls newsprint.
——, *Savonia,* Mantypuoto, 41 bls. wrapping paper.
Price & Pierce, Ltd., *Blankaholm,* ——, 1,410 bls. unbleached sulphate, 2,850 bls. unbleached sulphite.

### PHILADELPHIA IMPORTS

WEEK ENDING DECEMBER 2, 1939

Gottesman & Co., Inc., *Exporter,* Constanza, 250 bls. bleached sulphite, 50 tons.
E. Butterworth & Co., *Black Eagle,* Antwerp, 41 bls. jute waste.
J. M. Hagy Waste Works, *Black Eagle,* Antwerp, 23 bls. rags.
A. Hurst & Co., *Donald McKay,* Buenos Aires, 100 bags casein, 6,000 kilos.
Chase National Bank, *Nosiro Maru,* Shanghai, 120 bls. cotton waste.

Nolan Bowmall & Co., Inc., *Exporter*, Constanza, 2,250 bls. bleached sulphite, 450 tons.

### BALTIMORE IMPORTS

WEEK ENDING DECEMBER 2, 1939

——, *Donald McKay*, Buenos Aires, 1,668 bags casein, 100,020 kilos.
Nolan Bowmall & Co., Inc., *Exporter*, Constanza, 2,500 bls. unbleached sulphite, 500 tons.

### LOS ANGELES IMPORTS

WEEK ENDING DECEMBER 2, 1939

——, *Keisho Maru*, Osaka, 4 cs. transparent paper.
——, *Keisho Maru*, Yokohama, 2 cs. colored paper, 10 bls. rags.
——, *Pr. Taft*, Hong Kong, 1 cs. metal coated paper.

## Algonquin Paper Co. Busy

[FROM OUR REGULAR CORRESPONDENT]

OGDENSBURG, N. Y., December 4, 1939—The Algonquin Paper Company has finished the overhauling of equipment and operations have been resumed after a shutdown of two days. The plant, largest in the city, is now being operated on four shifts of six hours each and newsprint is manufactured for use in all sections of the state besides several mid-western and southern points. The sulphite mill, adjoining the main plant, has also been placed in readiness for operation and is expected to employ about 30 additional men when the machinery is started. An increased demand for sulphite and a reduction in imports of that product has resulted in the reopening of many sulphite plants in this state.

## Japan May Seek Pulp Here

European conditions and resultant shipping difficulties may force Japanese rayon interests to look to the United States and Canada for the bulk of their pulp imports in the rest of this year, the Department of Commerce reports. Because of the uncertainty regarding shipments the rayon industry is said to have received government approval "in principle" for the import of 30,000 tons of pulp from the American continent.

## Dilts Beaters Going to Houston

THE ABOVE ILLUSTRATION REPRESENTS THE FIRST SHIPMENT OF DILTS NEW TYPE BEATERS FOR THE NEW MILL OF THE CHAMPION PAPER AND FIBRE COMPANY AT HOUSTON, TEXAS. THE PICTURE SHOWS SIX DILTS KEYED BANDLESS ROLLS LEAVING THE PLANT OF DILTS MACHINE WORKS, FULTON, N. Y.

## To Hold Holiday Luncheon

The New York Luncheon Club of the National Association of Waste Material Dealers, Inc., will hold a Holiday Luncheon on Tuesday, December 19 in the East Ballroom of the Hotel Astor, New York. The fact that the luncheon is held so close to the beginning of the Holiday season makes it quite probable that the attendance will be exceptionally large. The regular December meeting of the board of directors of the association has been called for the same day and will immediately follow the N.A.W.M.D. club luncheon. This will bring a number of out-of-town dealers and a particularly large delegation is expected from Philadelphia, Baltimore and other nearby cities.

Members will gather in a large and attractive lounging room adjacent to the East Ballroom for refreshments and a fine opportunity to meet those who are attending. Facilities will be available from 12:00 noon until 3:00 P.M. and luncheon will be served at 1:00 P.M. The entire affair will be most informal and will offer to the trade a fine opportunity to meet and discuss with each other the many problems now developing in the waste material trade.

The cost of the Luncheon will be $1.50 per person. No tickets will be sold in advance but reservations must be made by those desiring to attend. Reservations should be made by letter, wire or telephone (Telephone BRyant 9-1318) to association headquarters, 1109 Times Building, New York. Members of the trade are urged to attend what is expected to be the largest and most enjoyable luncheon yet held.

## International Sets $50 Newsprint Price

R. J. Cullen, president of the International Paper Company, has announced that International is extending its present newsprint prices until June 30, 1940, without change. When hostilities were declared in Europe early in September, International promptly announced that its standard prices for newsprint then in effect would hold good throughout the first three months of the coming year. The continuance of the present price during a time when conditions are becoming increasingly difficult is further evidence of the company's desire to maintain an orderly newsprint market.

A dual price situation again prevails in the industry, as the Great Northern Paper Company had previously announced a price of $49 per ton for the first quarter of 1940 and $50 per ton for the second quarter of next year. Canadian manufacturers announced a continuation of the prevailing price of $50 per ton some weeks ago.

## Paper Firm Pleads Not Guilty

Not guilty pleas to an indictment alleging conspiracy to fix prices and control production in the kraft paper industry in violation of the Sherman Anti Trust Law were entered in the Federal Court in New York Wednesday by the Kraft Paper Association, thirty-three corporate members of it and fourteen individuals. Bail of one thousand dollars was set for each. The case was set on the calendar for February 5, 1940 at which time a definite trial date will be fixed.

# Latest Review of Paper and Pulp Markets

## Production and Sales Continue To Be Maintained At A High Level — Wholesale Trade For Last Month Up—Paper and Paper Board Products Were Up 29.7 Per Cent — Prices Advanced On Some Chemical Pulps.

Office of the PAPER TRADE JOURNAL,
Wednesday, December 6, 1939.

Sales volume in the wholesale paper market continues to be well maintained this week, according to reports received from many manufacturers' representatives, jobbers, and general paper merchants. Reports from paper and paper board mills are also most encouraging.

The index of general business activity dropped slightly to 105.6 per cent for the week ended November 25, from 105.9 per cent for the previous week, compared with 92.9 per cent for the corresponding week last year.

Paper production as reported by 205 mills for the week ended November 25 was estimated at 95.2 per cent, compared with 74.4 per cent for the like week in 1938, and with 58.0 per cent in 1937.

Paper board production for the week ended November 25 was 78.0 per cent, compared with 57.0 per cent for the corresponding period in 1938, and with 50.0 per cent in 1937.

According to the November report of the Department of Commerce, manufacturers' sales in October were 24.9 per cent above the same month last year. Wholesale trade was 11.5 per cent higher for the like period. Total manufacturers' sales were $444,000,000, compared with $433,000,000 in September, and with $356,000,000 for October, 1938. The total gains in paper and allied products in October over the like month last year, amounted to 29.7 per cent. Writing paper, etc., wax paper, all other paper and paper board and products were all up more than 25 per cent. The wholesale volume of paper and paper products was 17.6 per cent higher in October of this year than for the like month last year. The cost value of stocks on hand at the end of October for 1,729 wholesalers was up 3.6 per cent and 6.1 per cent higher than in October, 1938.

The outlook in the newsprint industry continues to improve. Canadian production is rising and domestic producers are reported as maintaining output at capacity.

Some declines in sales volume in some grades of paper has been reported during the current week. Production of many grades of paper has dropped a little from the peak reached last month and some further ttapering off is expected in both production and sales prior to the holidays and the inventory taking period. Prices are firm and no important change has been reported this week.

### Mechanical Pulp

An active demand continues to maintain production of mechanical pulp at a high level and prices remain firm, with the trend upward. No change from prevailing market quotations has been reported during the current week.

### Chemical Pulp

Demand for chemical pulp continues active. Prices on all grades are firm and the trend is upward. Prices on good grades of bleached and easy-bleaching sulphite, and on bleached kraft have been advanced. Prime domestic and foreign bleached sulphite pulp is currently quoted at from 3.00 to 3.25, easy-bleaching at from 2.30 to 2.50, and bleached kraft pulp at from 3.00 to 3.25.

### Old Rope and Bagging

No important change in the old rope market has been reported this week. Prices remain unchanged with the mill price prevailing at 4.00 on No. 1 domestic old Manila rope. Supply of foreign rope is reported more limited as current receipts are light. Prices on all grades of rope, strings and threads, are firm and unchanged.

Trading in old bagging is reported as less active this week. No important change in prices has been reported to date.

### Rags

The domestic rag market continues to be reported as slow. Prices are firm on all grades of new and old rags, with no changes reported this week. Export trade is reported as slow and importers are reported having difficulty in getting cargo space and rag shipments from France have dropped to a low point.

### Old Waste Paper

No important change has been reported in the paper stock market during the current week. Prices on all the higher grades are firm. Somewhat lower prices have been expected in the trade on No. 1 mixed paper and on some of the lower grades but at this date no changes from prevailing market quotations have been reported.

### Twine

Although reports have been received this week of some small spot sales of hard fiber twines, particularly on Java, at higher prices, the average and representative market quotations on all grades of hard and soft fiber twines remain unchanged at prevailing quotations.

## Place Large Order for Howard Bond

PHILADELPHIA, Pa., December 4, 1939—Garrett-Buchanan Company announce that in view of the ever increasing popularity of Howard bonds, "The Nation's Business Paper", the company recently placed one of the largest individual orders in the history of the paper maker. Garrett-Buchanan Company carries a complete line of the Howard Bond Executive stationery in two sizes of cabinets and five stock finishes, including bond, ripple laid, handmade and linen. The small cabinets contain 100 each of envelopes and paper in Monarch size. The larger case contains 250 of each. The order was placed early, the company said, to enable printers to fill profitably, holiday orders from churches, societies, fraternal organizations, schools, colleges, etc.

# Miscellaneous Markets

Office of the PAPER TRADE JOURNAL,
Wednesday, December 6, 1939.

BLANC FIXE—Prices on blanc fixe continue firm under a good demand. The pulp is currently quoted at from $42.50 to $45 per ton, in bulk; the powder is offered at from 3½ to 3¾ cents per pound, in barrels, at works.

BLEACHING POWDER—Quotations on bleaching powder are firm under a good demand, with prices unchanged at prevailing market levels. Bleaching powder is currently quoted at from $2 to $2.85 per 100 pounds, in drums, at works.

CASEIN—Prices on casein are a little lower for the current week. Standard domestic casein, 20-30 mesh, is currently quoted at 18 cents per pound; 80-100 mesh, at 18½ cents per pound; all prices in bags, car lots. Argentine casein, 20-30 mesh, is currently quoted at 15 cents per pound. Quotations on French casein, at from 14 to 14½ cents per pound, are nominal.

CAUSTIC SODA—Prices on caustic soda are firm under a heavy demand. Solid caustic soda is currently quoted at from $2.30 to $2.40 per 100 pounds; flake and ground at from $2.70 to $2.95 per 100 pounds, in drums, at works.

CHINA CLAY—Quotations on china clay continue firm under a good demand. Domestic filler clay is currently quoted at from $7 to $15 per ton; coating clay at from $11 to $22 per ton, at mines. Imported clay is quoted at from $13.50 to $25 per ton, ship side.

CHLORINE—Prices on chlorine continue firm under a steady demand at prevailing market quotations. Chlorine is currently quoted at $1.75 per 100 pounds, in single-unit tank cars, f.o.b., works.

ROSIN—The rosin market continues to be reported as firm, with prices on some grades a little higher for the week. "G" gum rosin is currently quoted at $5.25 per 280 pounds, gross weight, in barrels, at Savannah. "FF" wood rosin is quoted at $5.10 per 280 pounds, gross weight, in barrels, New York. Seventy per cent gum rosin size is offered at $2.83 per 100 pounds, f.o.b., shipping point.

SALT CAKE—Prices on salt cake continue to be reported as practically nominal because of the heavy demand. Current quotations range at from $15 to $19 per ton; chrome salt cake at from $15 to $16 per ton, f.o.b., shipping point. Prices on imported salt cake are nominal.

SODA ASH—Quotations on soda ash are firm under a good demand, and unchanged at prevailing market levels. Quotations on soda ash in car lots, at works, per 100 pounds, are as follows; in bulk, $.90; in bags, $1.10; and in barrels, $1.35.

STARCH—Quotations on corn starch are reported a little lower for the current week. Globe pearl is quoted at $2.40 per 100 pounds; special paper starch at $2.50 per 100 pounds. All prices in bags, car lots, f.o.b., Chicago.

SULPHATE OF ALUMINA—Quotations on sulphate of alumina are firm under a steady demand. The commercial grades are currently quoted at $1.15; iron free at $1.45 per 100 pounds, in bags, car lots, f.o.b., works.

SULPHUR—Prices on sulphur are firm under a good demand and continue unchanged at prevailing market levels. Annual contracts are currently quoted at $16 per long ton, f.o.b., mines. Spot and nearby car lots are quoted at $19 per ton.

TALC—Quotations on talc continue firm and unchanged at prevailing market prices. Domestic talc is currently quoted at from $15 to $18 per ton, Eastern mines. Imported talc is currently quoted at from $23 to $45 per ton.

# Market Quotations

## Paper

(Delivered New York)

| | | | |
|---|---|---|---|
| News, per ton— | | | |
| Roll, contract | $50.00 | @ | — |
| Sheets | 58.00 | " | — |
| Kraft—per cwt.—Delivered Zone A | | | |
| Northern, Extra Quality | $4.87½ | @ | $5.50 |
| Superstandard | 4.50 | " | 5.00 |
| Northern Standard Wrapping | 4.25 | " | 4.50 |
| Standard Wrapping | 4.00 | " | — |
| Tissues—Per Ream—Carlots | | | |
| White No. 1 | .87½ | @ | — |
| White No. 1 M. G. | .85 | " | — |
| White No. 1½ | .70 | " | — |
| White No. 2 | .65 | " | — |
| Anti-Tarnish M. G. | .75 | " | — |
| Colored | .80 | " | — |
| Kraft | .75 | " | — |
| Manila | .65 | " | — |
| Unbl. Toilet, 1 M. | 3.50 | " | — |
| Bleached Toilet | 5.26 | " | — |
| Paper Towels, Per Case— | | | |
| Unbleached, Jr. | 1.85 | @ | — |
| Bleached, Jr. | 3.20 | " | — |
| Manila—per cwt.—C. l. f. a. | | | |
| No. 1 Jute | 8.25 | @ | 10.25 |
| No. 1 Manila Wrapping, 35 lb. | 5.25 | " | — |
| No. 2 Manila Wrapping, 35 lb. | 5.00 | " | — |
| Boards, per ton— | | | |
| News | 45.00 | @ | — |
| Chip | 45.00 | " | — |
| Sgl. Mla. Ll. Chip | 57.50 | " | — |
| Jute Lined Chip | 57.50 | " | — |
| White Pat. Coated | 70.00 | " | — |
| Kraft Liners | 55.00 | " | — |
| Binders Boards | 76.00 | " | 87.00 |

The following are representative of distributors' resale prices:

Rag Content Bonds and Ledgers—White, Assorted Items, Delivered in Zone 1:

| | Bonds | | Ledgers | |
|---|---|---|---|---|
| 100% Rag Ext. No. 1 | $39.10 | @ $46.00 | $40.25 | @ $47.25 |
| 100% Rag | 31.05 | " 36.50 | 32.20 | " 37.75 |
| 85% Rag | .... | " .... | 29.90 | " 35.00 |
| 75% Rag | 23.60 | " 27.75 | 24.75 | " 29.00 |
| 65% Rag | .... | " .... | 21.65 | " 26.25 |
| 50% Rag | 17.55 | " 21.50 | 18.70 | " 22.75 |
| 25% Rag | 14.65 | " 17.75 | 15.80 | " 19.25 |

Colors at $1.00 cwt. extra.

Sulphite Bonds and Ledgers—White, Assorted Items, Delivered in Zone 1:

| | Bonds | | Ledgers | |
|---|---|---|---|---|
| No. 1 | $8.95 | @ $11.00 | $10.10 | @ $12.25 |
| No. 2 | 8.05 | " 9.75 | 9.25 | " 11.25 |
| No. 3 | 7.60 | " 9.25 | 8.50 | " 10.75 |
| No. 4 | 7.30 | " 9.00 | 8.50 | " 10.25 |

Colors $1.00 cwt. extra.

Free Sheet Book Papers—White, Cased Paper, Delivered in Zone 1:

| | | | |
|---|---|---|---|
| No. 1 Glossy Coated | $11.90 | @ | $13.50 |
| No. 2 Glossy Coated | 10.35 | " | 11.75 |
| No. 3 Glossy Coated | 9.55 | " | 11.00 |
| No. 4 Glossy Coated | 9.15 | " | 10.50 |
| No. 1 Antique (watermarked) | 8.35 | " | 9.50 |
| No. 2 Offset | 7.70 | " | 9.00 |
| A Grade E. F. | 7.50 | " | 8.75 |
| A Grade S. & S. C. | 7.75 | " | 9.00 |
| B Grade E. F. | 6.95 | " | 8.00 |
| B Grade S. & S. C. | 7.20 | " | 8.25 |
| C Grade E. F. | 6.65 | " | 7.75 |
| C Grade S. & S. C. | 6.90 | " | 8.00 |
| D Grade E. F. | 6.40 | " | 7.50 |
| D Grade S. & S. C. | 6.65 | " | 7.75 |

Ivory & India at $.50 cwt. extra.

## Mechanical Pulp

(On Dock, Atlantic Ports)

| | | | |
|---|---|---|---|
| No. 1 Imported— | | | |
| Moist | $34.00 | @ | 36.00 |
| Dry | 34.00 | " | 36.00 |
| (Delivered) | | | |
| No. 1 Domestic and Canadian | 40.00 | @ | 42.00 |

## Chemical Pulp

(On Dock, Atlantic, Gulf and West Coast Ports)

| | | | |
|---|---|---|---|
| Bleached Sulphite (Domestic and Foreign)— | | | |
| Prime Bleached Sulphite | 3.00 | @ | 3.25 |
| Prime Qualities— | | | |
| Easy-Bleaching Sulphite | 2.30 | " | 2.50 |
| Strong Unbleached Sulphite | 2.10 | " | 2.30 |
| (On Dock, Atlantic Ports) | | | |
| Kraft Bleached | 3.00 | @ | 3.25 |
| Kraft Light & Strong | 1.65 | " | 1.80 |
| Kraft No. 1 | 1.60 | " | 1.75 |
| (F. o. b. Pulp Mill) | | | |
| Kraft Domestic | 1.60 | " | 2.12½ |
| (Delivered) | | | |
| Soda Bleached | 2.90 | " | — |

Add 60 cents per short ton, dock charges for Albany; $2.50 for Lake Ports East and $3.50 for Lake Ports West of Mackinac Straits. Also add extra freight charges and war insurance to all quotations on imported pulp.

## Domestic Rags

### New Rags

(Prices to Mill f. o. b. N. Y.)

| | | | |
|---|---|---|---|
| Shirt Cuttings— | | | |
| New White, No. 1. | 7.75 | @ | 8.00 |
| Silesias No. 1 | 5.25 | " | 5.50 |
| New Unbleached | 7.75 | " | 8.00 |
| Blue Overall | 5.50 | " | 5.75 |
| Fancy | 2.50 | " | 3.00 |
| Washables | 2.15 | " | 2.25 |
| Mixed Khaki Cuttings | 2.75 | " | 3.00 |
| O. D. Khaki Cuttings | 3.00 | " | 3.25 |

### Old Rags

| | | | |
|---|---|---|---|
| White, No. 1— | | | |
| Repacked | 3.50 | " | 4.00 |
| Miscellaneous | 3.00 | " | 3.25 |
| White, No. 2— | | | |
| Repacked | 1.25 | " | 2.75 |
| Miscellaneous | 1.75 | " | 1.90 |
| Thirds and Blues— | | | |
| Repacked | 2.00 | " | 2.25 |
| Miscellaneous | 1.75 | " | 1.90 |
| Roofing Rags— | | | |
| No. 1 | 1.70 | " | 1.80 |
| No. 2 | 1.35 | " | 1.40 |
| No. 3 (bagging) | 1.50 | " | 1.60 |
| No. 4 | .60 | " | .65 |
| No. 5A | .60 | " | .65 |

## Foreign Rags

All prices nominal.

### New Rags

| | | | |
|---|---|---|---|
| New Dark Cuttings | 2.25 | @ | 2.40 |
| New Mixed Cuttings | 2.00 | " | 2.20 |
| New Light Silesias | 5.50 | " | 5.75 |
| Light Flannelettes | 5.50 | " | 5.75 |
| New White Cuttings | 7.00 | " | 7.50 |
| New Light Oxford | 4.00 | " | 4.50 |
| New Light Prints | 3.00 | " | 3.25 |

### Old Rags

| | | | |
|---|---|---|---|
| No. 1 White Linens | 7.50 | " | 8.50 |
| No. 2 White Linens | 6.50 | " | 7.50 |
| No. 3 White Linens | 4.50 | " | — |

# MURRAY

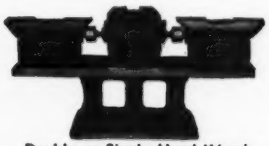
## WOODROOM AND PAPER MILL EQUIPMENT . . . .

Our engineering services are always available to help you solve your mill problems. Write for information on our new complete line of wood cleaning equipment.

Murray-Branch Barking Drum

New Murray Knot Drill

Murray Pulpwood Chipper



Double or Single Head Wood Cleaner

Murray High-Speed Hammer Chip Crusher

Collapsible Winder Shafts

## D. J. MURRAY MFG. CO.

WAUSAU, WISCONSIN



# PULP

## BLEACHED SULPHITE

*'Stormont' Grade*

## BLEACHED SODA

*'Seagull' Grade*

## GROUNDWOOD

*'Crabtree' Grade*

## BLEACHED KRAFT

*'Tuftare Fibre' Grade*

made by

## HOWARD SMITH PAPER MILLS LIMITED

**407 McGill St., Montreal, Canada**

*Sulphite & Soda Mill:* Cornwall, Ont. *Groundwood Mill:* Crabtree Mills, P.Q. *Kraft Mill:* Windsor Mills, P.Q.



*More than just a* TRADE MARK

EXCELSIOR KNOX Woolen Co. Camden, Me. FELTS & JACKETS

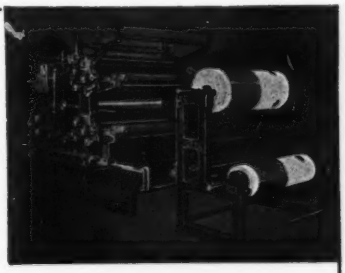
BUT also a guarantee by men who for 75 years have prided themselves in making finer felts. TO YOU —this is the mark of dependability, longer felt life and greater saving.

## KNOX WOOLEN CO.

CAMDEN, MAINE.



## A LINE OF MACHINES YOU CAN DEPEND ON



**PRINTING PRESSES**

Rotary — Multi-color
Oil Ink — Arc-type
Analine — In series
Bag and Notion Envelope

**EMBOSSERS**

1. Glassine
2. Board
3. Towel
4. Tissue
5. Napkin
6. Wrapping
7. Special Purpose

**MISCELLANEOUS**

Toilet Roll Wrappers
Vacuum Pumps
Seat Cover Machines
Die Inkers
Core Machines
Core Recutters

**FOLDERS**

Towel — Wax
Tissue — Facial Tissue
Napkin — Table Covers

**WINDERS**

Toilet Towels — Crepe, Jumbo Roll

**CREPE MACHINE**

Tissue — Kraft
Waterproof

**BUNDLING PRESSES**

Adjustable — Napkin
Multi-Wall Bag

## PAPER CONVERTING MACHINE CO.

GREEN BAY, WISCONSIN

*Manufacturers of paper converting machinery for all purposes.*

| | | | |
|---|---|---|---|
| No. 4 White Linens. | 2.25 | @ | 3.25 |
| No. 1 White Cotton. | 4.25 | " | 4.75 |
| No. 2 White Cotton. | 3.25 | " | 3.75 |
| No. 3 White Cotton. | 2.50 | " | 3.00 |
| No. 4 White Cotton. | 1.90 | " | 2.20 |
| Extra Light Prints.. | 2.00 | " | 2.40 |
| Ord. Light Prints... | 1.75 | " | 2.15 |
| Med. Light Prints... | 1.55 | " | 1.95 |
| Dutch Blue Cottons. | 2.25 | " | 2.50 |
| French Blue Linens.. | 3.00 | " | — |
| Checks and Blues... | 2.00 | " | — |
| Linsey Garments.... | 1.90 | " | 2.00 |
| Dark Cottons..... | 1.50 | " | 1.60 |
| Old Shopperies..... | 1.30 | " | 1.45 |
| New Shopperies..... | 1.45 | " | 1.50 |
| French Blues..... | 2.25 | " | 2.50 |

### Old Rope and Bagging

(Prices to Mill, f. o. b. N. Y.)

| | | | |
|---|---|---|---|
| Gunny No. 1— | | | |
| Foreign ..... | 2.50 | @ | 2.75 |
| Domestic ..... | 2.25 | " | 2.50 |
| Wool Tares, light... | 1.75 | " | 2.00 |
| Wool Tares, heavy.. | 1.80 | " | 1.90 |
| Bright Bagging..... | 2.25 | " | 2.50 |
| Manila Rope— | | | |
| Foreign ..... | 3.90 | " | 4.15 |
| Domestic ..... | 3.75 | " | 4.00 |
| Jute Threads..... | 3.00 | " | 3.25 |
| Sisal Strings..... | 2.00 | " | 2.25 |
| Mixed Strings..... | .70 | " | .85 |

### Old Waste Papers

(F. o. b. New York)

| | | | |
|---|---|---|---|
| Shavings— | | | |
| White Envelope Cuttings ..... | 2.75 | @ | 3.25 |
| Ordinary Hard White No. 1.... | 2.25 | @ | 2.50 |
| Soft White No. 1.. | 1.70 | " | 1.80 |
| Soft White Extra.. | 2.50 | " | 2.60 |
| Flat Stock— | | | |
| Stitchless ..... | 1.10 | " | 1.25 |
| Overissue Mag.... | 1.00 | " | 1.10 |
| Solid Flat Book... | .90 | " | 1.00 |
| Crumbled No. 1... | .70 | " | .75 |
| Ledger White Stock. | 1.55 | " | 1.65 |
| Ledger Stock Colored | 1.05 | " | 1.15 |
| Manila— | | | |
| New Env. Cut.... | 1.70 | " | 1.80 |
| New Cuttings..... | 1.40 | " | 1.50 |
| Old Kraft Machine— | | | |
| Compressed bales.. | 1.00 | " | 1.10 |
| News— | | | |
| No. 1 White News | 1.75 | " | 1.90 |
| Strictly Overissue. | .70 | " | .75 |
| Strictly Folded.... | .55 | " | .60 |
| Corrugated ..... | .60 | " | .65 |
| No. 1 Mixed Paper.. | .52½ | " | .57½ |

### Twines

(F. o. b. Mill)

(Soft Fiber)

| | | | |
|---|---|---|---|
| Coarse Polished— | | | |
| India ..... | .18½ | @ | — |
| White Hemp..... | .18½ | " | — |
| Fine Polished— | | | |
| Fine India..... | .23 | " | — |
| Unpolished— | | | |
| Box ..... | .14¾ | " | — |
| Paper Makers..... | .15 | " | — |
| Tube Rope..... | .16¼ | " | — |
| Wall Paper..... | .15¾ | " | — |
| Wrapping ..... | .18 | " | — |
| Soft Fiber Rope... | .16¼ | " | — |
| Cotton ..... | .21 | " | — |

(Hard Fiber)

| | | | |
|---|---|---|---|
| Medium Java..... | .19 | " | — |
| Mex. Sisal..... | .16 | " | — |
| Manila ..... | .24 | " | — |

## PHILADELPHIA

### Domestic Rags (New)

(Price to Mill, f.o.b. Phila.)

| | | | |
|---|---|---|---|
| Shirt Cuttings— | | | |
| New White No. 1. | .07¼ | @ | .07½ |
| New White No. 2. | .04 | " | .04½ |
| Light Silesias..... | — | " | .04½ |
| Silesias, No. 1.... | — | " | .04½ |
| Black Silesias, soft | — | " | .03¾ |
| New Unbleached.. | .05½ | " | .06 |
| Washable, No. 1.. | — | " | .04 |
| Blue Overall..... | — | " | .05 |
| Cottons—According to grades— | | | |
| Washable No. 2... | — | " | .02 |
| New Blue ..... | — | " | .02 |
| Fancy Percales.... | — | " | .03 |
| New Black Soft... | — | " | .04 |
| New Light Seconds | .04½ | " | .05 |
| New Dark Seconds | — | " | 1.50 |
| Khaki Cuttings— | | | |
| No. 1 O. D..... | .03½ | " | .04 |
| No. 2 Mixed..... | .03 | " | .03¼ |
| Corduroy ..... | — | " | .02½ |
| New Canvas..... | .05½ | " | .06 |
| New Black Mixed. | — | " | .03 |

### Domestic Rags (Old)

| | | | |
|---|---|---|---|
| White No. 1— | | | |
| Repacked ..... | 3.50 | @ | 4.00 |
| Miscellaneous .... | 2.75 | " | 3.00 |
| Thirds and Blues— | | | |
| Miscellaneous .... | 2.00 | " | 2.25 |
| Repacked ..... | 2.50 | " | 2.75 |
| Black Stockings (Export) ..... | 3.50 | " | 4.00 |
| Roofing Stock— | | | |
| Foreign No. 1....Nominal | | | |
| Domestic No. 1.. | 1.50 | " | 1.60 |
| Domestic No. 2... | 1.35 | " | 1.45 |
| Roofing Bagging.. | — | " | 1.30 |

### Bagging

(f.o.b. Phila.)

| | | | |
|---|---|---|---|
| Gunny, No. 1— | | | |
| Foreign .....Nominal | | | |
| Domestic ..... | 2.50 | @ | 3.00 |
| Manila Rope..... | — | " | 4.50 |
| Sisal Rope..... | 1.75 | " | 2.00 |
| Mixed Rope..... | 1.25 | " | 1.50 |
| Scrap— | | | |
| No. 1..... | 2.50 | " | 2.75 |
| No. 2..... | — | " | 1.40 |
| Wool Tares, heavy.. | 3.50 | " | 3.70 |
| Mixed Strings .... | .75 | " | 1.00 |
| No. 1 New Light Burlap ..... | 3.00 | " | 3.50 |
| New Burlap Cuttings | 2.00 | " | 2.25 |

### Old Papers

(f.o.b. Phila.)

| | | | |
|---|---|---|---|
| Shavings— | | | |
| No. 1 Hard Write | 2.25 | @ | 2.30 |
| No 2 Hard White | 2.00 | " | 2.10 |
| No. 1 Soft White | 1.85 | " | 1.90 |
| No. 2 Soft White | 1.50 | " | 1.60 |
| No. 1 Mixed..... | .90 | " | 1.00 |
| Solid Ledger Stock.. | 1.50 | " | 1.60 |
| Ledger Stock, white | 1.30 | " | 1.35 |
| Ledger Stock, colored | 1.00 | " | 1.10 |
| No. 1 Books, heavy | .80 | " | .90 |
| Manila Cuttings..... | 1.90 | " | 2.00 |
| Print Manila..... | .70 | " | .75 |
| Container Manila... | .65 | " | .70 |
| Kraft Paper..... | 1.00 | " | 1.10 |
| No. 1 Mixed Paper.. | .55 | " | — |
| Straw Board Chip.. | .50 | " | — |
| Binders Board Chip | .50 | " | — |
| Corrugated Board... | .60 | " | .65 |
| Overissue News..... | .70 | " | .75 |
| Old Newspapers.... | .65 | " | .70 |

## BOSTON

### Old Papers

(f.o.b. Boston)

| | | | |
|---|---|---|---|
| Shavings— | | | |
| No. 1 Hard White | 2.25 | @ | 2.50 |
| No. 1 Soft White | 1.85 | " | 2.15 |
| No. 2 Mixed..... | .75 | " | .80 |
| Solid Ledger Books.. | 1.30 | " | — |
| Overissue Ledger Stock ..... | 1.30 | " | 1.50 |
| Mixed Ledgers..... | .85 | " | .90 |
| No. 1 Books, heavy.. | 1.00 | " | 1.10 |
| No. 1 Books, light.. | .65 | " | .75 |
| Crumpled Stitchless Book Stock..... | .55 | " | .65 |
| Manila Env. Cuttings | 1.70 | " | 1.85 |
| Manila Envelope Cuttings, extra quality | 2.35 | " | 2.60 |
| White Blank News.. | 1.40 | @ | 1.50 |
| No. 1 Kraft..... | 1.10 | " | 1.20 |
| Mixed Papers..... | .52½ | " | .55 |
| Print Manila..... | .70 | " | .75 |
| Container Manila... | .60 | " | .70 |
| Old Newspapers.... | .60 | " | .65 |
| Paper Wool Strings | .80 | " | .90 |
| Overissue News..... | .70 | " | .75 |
| Box Board Chips.... | .52½ | " | .55 |
| Corrugated Boxes.... | .60 | " | .62½ |
| Kraft corrugated boxes | 1.00 | " | 1.05 |
| Screening Wrappers | .60 | " | .70 |

### Bagging

(f.o.b.Boston)

| | | | |
|---|---|---|---|
| Manila Rope— | | | |
| Foreign ..... | 4.25 | @ | 4.50 |
| Domestic ..... | 4.00 | @ | 4.50 |
| Sisal Rope ..... | 2.25 | " | 2.50 |
| Mixed Rope ..... | .75 | " | 1.00 |
| Transmission Rope .. | 3.00 | " | — |
| Soft Jute Ropes..... | 3.00 | " | 3.10 |
| Jute Carpet Threads. | 1.25 | " | 1.50 |
| Gunny Bagging— | | | |
| Foreign ..... | 2.50 | " | — |
| Domestic ..... | 2.10 | " | 2.25 |
| Bleachery Burlap ... | 3.00 | " | 3.50 |
| Scrap Burlap— | | | |
| Foreign ..... | 2.40 | " | 2.50 |
| Domestic ..... | 1.90 | " | 2.00 |
| Scrap Sisal ..... | 2.25 | " | 2.35 |
| Scrap Sisal for Shredding ..... | 2.50 | " | 2.60 |
| Wool Tares, Heavy .. | 2.40 | " | 2.50 |
| New Burlap Cuttings | 2.85 | " | 3.00 |
| Aust. Wool Pouches. | 3.25 | " | 3.50 |
| Heavy baling bagging | 2.65 | " | 2.75 |
| Paper Mill Bagging.. | 1.25 | " | 1.50 |
| No. 2 Bagging ..... | 1.10 | " | 1.25 |

### Domestic Rags ( New)

(F. o. b. Boston)

| | | | |
|---|---|---|---|
| Shirt Cuttings— | | | |
| New Light Prints... | .03¼ | @ | .03½ |
| New White No. 1... | .08 | " | .08¼ |
| New Light Flannelettes ..... | .05 | " | — |
| Silesias No. 1 ..... | .05 | " | — |
| New Black Silesias.. | .03½ | " | .03¾ |
| Soft Unbleached.... | 7.50 | " | 8.00 |
| Blue Cheviots ..... | .05½ | " | .06 |
| Fancy ..... | .02 | " | .02½ |
| Washable ..... | .02 | " | .02½ |
| Cottons—According to grades— | | | |
| Blue Overalls .... | .05¼ | " | .05½ |
| New Black, soft .. | .03¼ | @ | .04 |
| Khaki Cuttings ..... | .02½ | " | .03 |
| O. D. Khaki ..... | .03 | " | .03¼ |
| Corduroy ..... | .02¾ | " | .03 |
| New Canvas..... | .06¾ | " | .07¼ |
| B. V. D. Cuttings... | .07 | " | .07½ |

### Domestic Rags (Old)

(F. o.b. Boston)

| | | | |
|---|---|---|---|
| Canvas ..... | .04¼ | @ | — |
| White No. 1— | | | |
| Repacked ..... | — | " | 2.75 |
| Miscellaneous ..... | 2.50 | " | 2.75 |
| White No. 2— | | | |
| Repacked ..... | 1.90 | " | 2.00 |
| Miscellaneous .... | 2.00 | " | 2.25 |
| Twos and Blues .... | 2.25 | " | 2.50 |
| Old Blue Overalls .. | 1.60 | " | 2.00 |
| Thirds and Blues— | | | |
| Repacked ..... | 2.00 | " | 2.25 |
| Miscellaneous .... | 1.50 | " | 1.60 |
| Black Stockings .... | 4.00 | " | 4.25 |
| Roofing Stock— | | | |
| No. 1..... | 1.75 | " | 2.00 |
| No. 2..... | 1.60 | " | 1.65 |
| No. 3..... | 1.00 | " | 1.25 |

### Foreign Rags

(F. o. b. Boston)

| | |
|---|---|
| Dark Cottons.....(nominal) | |
| Dutch Blues.....(nominal) | |
| New Checks and Blues(nominal) | |
| Old Fustians.....(nominal) | |
| Old Linsey Garments.(nominal) | |
| New Silesias.....(nominal) | |

## TORONTO

### Paper

### Bonds

Direct mill shipment in two-ton lots.

| | | | |
|---|---|---|---|
| N. 1 White .....$35.50 | @ | — | |
| No. 1 Tints ..... | 36.50 | " | — |
| No. 2 White ..... | 25.50 | " | — |
| No. 2 Tints ..... | 26.50 | " | — |
| No. 2 Golden Rod.. | 27.50 | " | — |
| No. 3 White ..... | 21.00 | " | — |
| No. 4 White ..... | 15.00 | " | — |
| No. 4 Tints ..... | 16.00 | " | — |
| No. 4 Golden Rod | 17.00 | " | — |

Direct mill shipment in three-ton lots.

| | | | |
|---|---|---|---|
| No. 5 White .....$10.50 | @ | — | |
| No. 5 Tints ..... | 11.50 | " | — |
| N. 5. Golden Rod.. | 12.00 | " | — |
| No. 6 White ..... | 9.00 | " | — |
| No. 6 Tints ..... | 9.50 | " | — |
| No. 6 Golden Rod.. | 11.00 | " | — |
| No. 7 White ..... | 8.00 | " | — |
| No. 7 Tints ..... | 8.50 | " | — |
| No. 7 Golden Rod.. | 10.00 | " | — |
| Book— | | | |
| No. 1 M. F. ..... | $7.00 | " | — |
| No. 2 M. F. ..... | 6.50 | " | — |
| No. 3 M. F. ..... | 5.35 | " | — |
| No. 1 S. C. ..... | 7.25 | " | — |
| No. 2 S. C. ..... | 6.75 | " | — |
| No. 3 S. C. ..... | 5.85 | " | — |

### Coated Book & Litho

Ton Lots (resale)

| | | | |
|---|---|---|---|
| No. 1 .....$12.00 | @ | — | |
| No. 2 ..... | 10.25 | " | — |
| No. 3 ..... | 8.90 | " | — |
| Coated tinted..... | 13.00 | " | — |
| Wrapping—delivered— | | | |
| Rag Brown..... | 4.85 | " | 5.25 |
| White Wrap..... | 4.00 | " | — |
| "B" Manila..... | 4.90 | " | 6.15 |
| No. 1 Manila.... | $5.50 | @ | $6.90 |
| Fiber ..... | 5.50 | " | 6.90 |
| Kraft No. 2..... | 5.50 | " | 6.90 |

(f.o.b. Cars, Toronto)

| | | | |
|---|---|---|---|
| News per ton— | | | |
| Rolls (contract).. | 46.00 | " | — |
| Sheets ..... | 54.00 | " | — |

### Pulp

| | | | |
|---|---|---|---|
| Ground wood.....$33.00 | @ | 36.00 | |
| Unbleached sulphite | 44.00 | " | — |
| Bleached sulphite... | 54.00 | " | — |
| Kraft ..... | 50.00 | " | — |
| Soda ..... | 54.00 | " | — |

### Old Waste Paper

(In carload lots, f.o.b. Toronto)

| | | | |
|---|---|---|---|
| Shavings— | | | |
| White Env. Cut.. | 2.15 | @ | — |
| Soft White..... | 2.00 | " | 2.15 |
| White Blk. News.. | 1.35 | " | 1.50 |
| Book and Ledger— | | | |
| Flat Magazine and Book Stock (old) | .90 | " | 1.00 |
| Light and Crumpled Book Stock..... | .80 | " | .90 |
| Ledgers and Writings ..... | 1.15 | " | — |
| Manilas— | | | |
| New Manila Cut.. | 1.55 | " | 1.60 |
| Printed Manilas... | .76 | " | — |
| Kraft ..... | 1.15 | " | — |
| News and Scrap— | | | |
| Strictly Overissue | .75 | " | — |
| Strictly Folded .. | .70 | " | — |
| No. 1 Mixed Paper | .60 | " | — |

## CHICAGO

### Waste Paper

(f.o.b. Chicago)

| | | | |
|---|---|---|---|
| Shavings— | | | |
| No. 1 White Envelope cuttings.. | 2.40 | @ | — |
| No. 1 Hard White | 2.23 | " | — |
| No. 1 Soft White | 2.00 | " | — |
| Ledger and Writings | 1.20 | " | — |
| Solid Books..... | .95 | " | — |
| Blanks ..... | 1.70 | " | — |
| Krafts ..... | 1.00 | " | — |
| New Kraft Cuts..... | 1.60 | " | — |
| Overissue News..... | .80 | " | — |
| Old Newspapers— | | | |
| No. 1 Folded News | .73 | " | — |
| No. 1 Mixed Paper | .63 | " | — |
| Roofing Stocks— | | | |
| No. 1 ..... | 1.25 | @ | — |
| No. 2 ..... | 1.15 | " | — |